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WATER QUALITY INVENTORY AND MANAGEMENT PLAN

LOWER CLARK FORK RIVER BASIN
MONTANA

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WATER QUALITY INVENTORY AND MANAGEMENT PLAN

LOWER CLARK FORK RIVER BASIN, MONTANA

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WATER QUALITY INVENTORY AND MANAGEMENT PLAN

LOWER CLARK FORK RIVER BASIN, MONTANA

I. INTRODUCTION

This report presents information relative to water quality and water quality management in the Lower Clark Fork River basin (Figure 1). This is one of sixteen basins designated by the state of Montana for preparation of water quality management plans. The Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) have directed states to prepare such plans as part of a nation-wide program for controlling water pollution. The objectives of this effort are to provide the state with water quality data and related information to (1) determine the water quality characteristics of all natural and waste waters, (2) determine what factors, both natural and manmade, affect the quality of waters, (3) develop a management strategy for maintaining and enhancing the quality of waters in the Lower Clarkfork River basin, and (4) provide information needed to determine whether Montana's water quality standards are and will continue to be met. Also included is a description of physical characteristics of the basin. The general methodology used in this study was the compilation and evaluation of existing water quality data and related information. Where information was deficient, field investigations and water and wastewater sampling and analysis were completed to obtain the needed information.

This investigation does not present a detailed analysis of the area's resources but summarizes water quality related information. As additional information becomes available, the Lower Clark Fork River basin water quality management plan will be revised and updated as part of Montana'a Continuing Planning Process.

Assistance in obtaining information for this report was obtained from a number of agencies and persons. The Montana Department of Natural Resources provided information on land use, water use, economy and population.

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II. SUMMARY AND CONCLUSIONS

There are 16 municipal, 7 agricultural, and 4 industrial discharges in the Lower Clark Fork drainage basin. Permits have been issued under the joint state-federal discharge permit system for 24 of these discharges. Permits for the remaining 3 are pending; two of those pending are for agricultural discharges. Federal compliance schedules have been established for 13 municipal and 4 industrial discharges. Best practicable treatment is required of industrial dischargers, and secondary treatment is required of municipal dischargers, by July 1, 1977.

With the application of best practicable and secondary treatment to industrial and municipal discharges, respectively, it is expected that all waters in the Lower Clark Fork basin will meet state water quality standards. However, in the case of one large pulp mill, where best practicable treatment is being installed, it is not yet certain whether standards for organic color and possibly phenols will be maintained. Therefore, the segment of the Clark Fork River from the Hoerner-Waldorf plant to Alberton has been tentatively designated as "water quality limited". Pending post-BPT treatment and additional water quality data this designation will be removed or else waste load allocations must be prepared for the segment. No portions of the lower Flathead drainage have been designated water quality limited.

Municipal facilities investments needed to achieve secondary levels of treatment for public sewage treatment facilities in the basin are estimated at approximately $2,100,000 although estimates are not available, and not included in this amount, for some 11 small communities. Construction is underway to provide secondary treatment for Missoula. Several smaller communities are proceeding with the planning and design phases of programs to upgrade their sewage treatment facilities as well.

A surveillance plan for continued monitoring of water quality in the Lower Clark Fork basin is described in this plan.

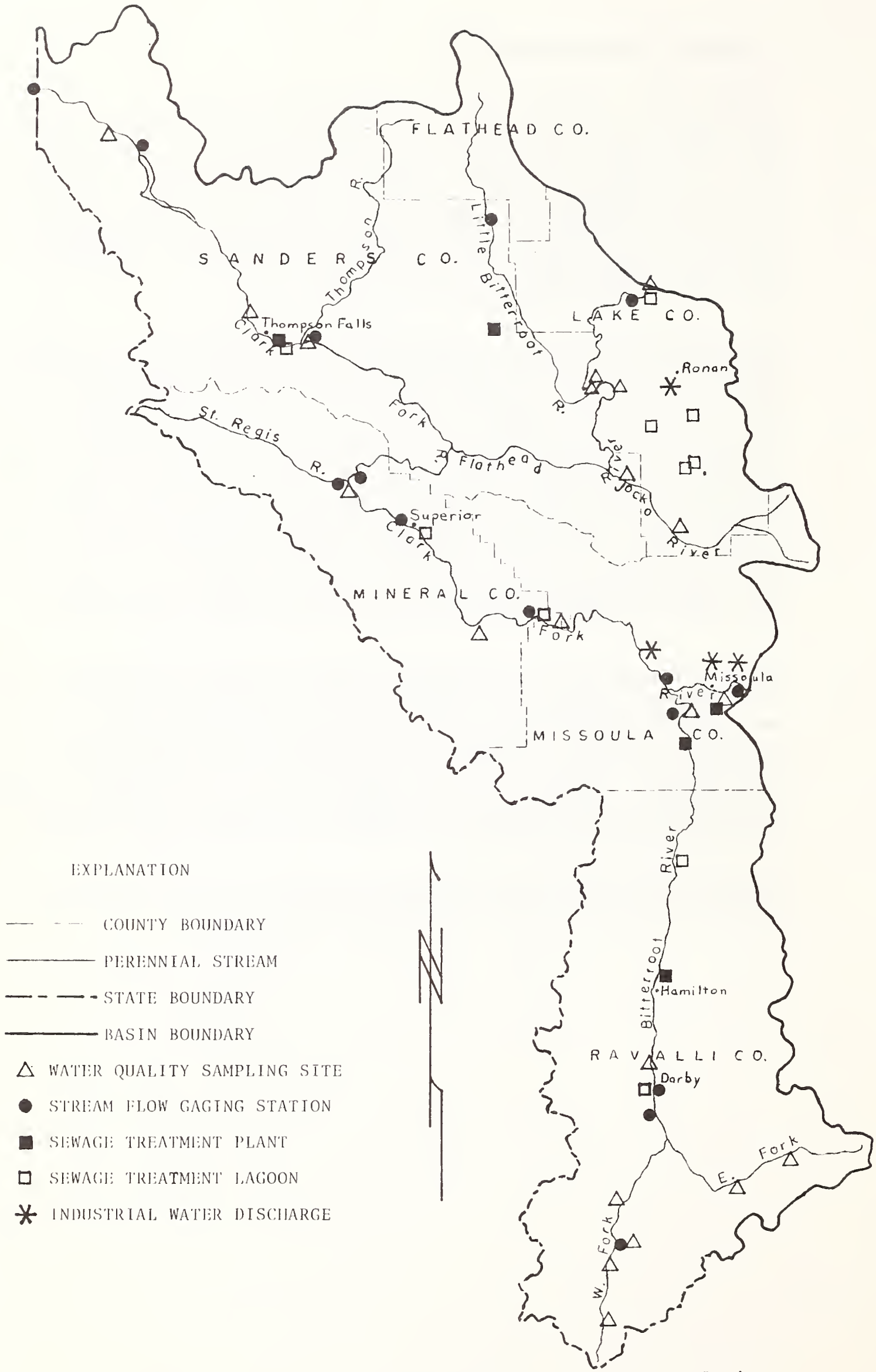

Figure 1. Sketch Map Showing Lower Clark Fork River Basin

III. RELATED INVESTIGATIONS AND PLANS

TECHNICAL INVESTIGATIONS

Technical water quality data are published by the U.S. Geological Survey annually (Ref. 22,23). Data from these volumes have been incorporated into this management plan.

In 1962, the Institute of Paper Chemistry published "A Summary of the Biological Studies of the Clark Fork River in the vicinity of Missoula, Montana for the years 1956-61," (Ref. 29). This report presents a year-by-year record of the biological condition of the Clark Fork River above and below the Hoerner-Waldorf pulp mill. The report includes pre-construction, post-construction but pre-treatment and finally post-treatment data. The report indicated a healthy balanced biota before plant construction. After the mill began discharging, the biological effects were fairly pronounced, indicating deterioration. A year later, treatment ponds were construction and the biological indications of pollution were reduced to moderate growths on the river bottom.

In 1970, the Bitterroot National Forest published a report on forest management practices (Ref. 30) in the Bitterroot drainage. Sources of siltation from logging activities were discussed with remedial measures suggested.

In 1971, the U.S. Environmental Protection Agency prepared an interim water quality management plan (Ref. 24) for the Clark Fork drainage basin. Parts of the report were used in the preparation of this management plan.

In 1973, the U.S. Environmental Protection Agency conducted a water quality study (Ref. 25) on the Clark Fork River from Missoula to Alberton. Data from the report are incorporated and discussed in the water quality section of this management plan.

The Dept. of Fish & Game and Dept. of Health sponsored flavor evaluation tests (Ref. 31) for fish collected from the Clark Fork River in the vicinity of the Hoerner-Waldorf pulp mill. The results of the tests indicated the flavor of fish, held below the mill discharge, was poorer than control fish (Ref. 34).

In addition, water quality data has been collected in several areas by the Dept. of Health & Environmental Sciences, the U.S. Forest Service, the Fish & Game Dept. and the University of Montana. This data is available in unpublished form from the individual sources.

In 1975, Bitterroot Water, Inc. published a report (Ref. 35) describing the water quantity situation in the Bitterroot drainage. Included are sections on water budget, water quality, water use, minimum fish requirements and effects of vegetation removal.

Section 201 Facility Plans

Facility plans are underway or recently completed for three communities in the Bitterroot drainage and will soon be started for seven communities in the Lower Flathead drainage. These communities are individually discussed in Section VI of this report, "Water Pollution Sources-Municipal Dischargers." Current status of 201 projects is shown in Table XVI.

Section 208, Areawide Waste Treatment Management Plans

Under the direction of the Flathead Drainage 208 Project, an areawide waste treatment management plan is in progress for the Flathead drainage basin. Within the Lower Clark Fork management plan area, some anticipated 208 projects include pesticide and irrigation return flow studies, facility plans for five municipalities, investigations of erosion on the Little Bitterroot River and land use related studies. The 208 Step I facility plans in progress include the towns of Hot Springs, Ronan, Polson, St. Ignatius and Arlee.

Level B and Other Federal Plans

Under state leadership of the Montana Dept. of Natural Resources and Conservation, a Level B water and related land resources study is in preparation, and is currently available in draft form (Ref. 27). This plan, which includes the Flathead drainage portion of the Lower Clark Fork management plan area, identifies major water quality problems and suggests alternate solutions. Some rough cost estimates are presented, particularly for sewerage projects.

A U.S. Dept. of Agriculture study is in progress in the Clark Fork drainage, relative to U.S.D.A. administered lands. This study will include some water quality work. The primary agencies involved are the U.S. Forest Service and the Soil Conservation Service.

A 22-volume, 16-appendix framework study, "Columbia-North Pacific Region Comprehensive Framework Study of Water and Related Lands," (Ref. 28) is a type I study of the entire Columbia River drainage basin, including two volumes on water quality and pollution control. The problems identified are on a broad, regional basis, but background data from this study were incorporated into the management plan.

IV. BASIN PHYSICAL CHARACTERISTICS

The Lower Clark Fork River basin (Figure 1 and Plate 1) is in the northern Rocky Mountains and is characterized by a broad flat valley in the upper portions, with scant to heavy timber, and numerous steep narrow valleys in the lowermost part of the drainage, where the river enters Idaho. Most of the area is sparsely inhabited, but a few major industries and major communities exist in the area. The Lower Clark Fork River basin actually is the lower portion of the Flathead drainage basin and the Clark Fork drainage basin. This area includes most of Lake County, all of Sanders County, all of Mineral County, and portions of Missoula and Flathead Counties. The basin is entirely drained by the Clark Fork River, which is tributary to the Columbia River.

Most waters in this basin are classified as B-D1 (See appendix B), although there are a number of watersheds for municipal use which are classified as A-Open or A-Closed. There are several exceptions to this generalization, including the Little Bitterroot River below Hubbart Reservoir, Hot Springs Creek downstream of the Hot Springs water supply, Mission Creek downstream of the Highway 93 crossing and the lower portions of Crow Creek. These exceptions were made primarily because of agricultural influences and erosion, however, Hot Springs Creek also is affected by the sewage discharge from the town of Hot Springs.

Waters classified as B-D1 are to be maintained suitable for drinking, culinary and food processing purposes after adequate treatment equal to coagulation, sedimentation, filtration, disinfection and any treatment necessary to remove naturally present impurities; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life; waterfowl and fur bearers; and agricultural and industrial water supply. General water quality requirements for those classifications of waters found in the Lower Clark Fork drainage and detailed water classification and water quality standards applicable to the basin are in Appendix B.

CLIMATE

Climate of the Lower Clark Fork River basin is characterized by warm summers and cold dry winters. The mountainous nature of the basin, however, causes a climate of considerable variability. The higher mountains receive much more precipitation than do the valley bottoms, particularly during the winter. Annual precipitation ranges from less than 10 inches southwest of Flathead Lake to over 80 inches in the higher mountains. May and June are the months of maximum precipitation with about half the annual precipitation falling during the growing season. The late fall, winter and spring are generally cloudy, but summer and early fall are characterized by days of clear skies interrupted occasionally by afternoon showers or thunderstorms. Typical data from weather stations in the basin are listed in Table I.

TABLE I
WEATHER DATA, LOWER CLARK FORK DRAINAGE BASIN

TEMPERATURE

Station	Highest of Record	Lowest of Record	January Average	July Average	Annual Average
Bigfork (1939-1960)	100	-20	26.2	67.5	46.0
Polson (1907-1960)	104	-30	25.1	67.4	45.5
Polson Kerr Dam (1951-1960)	104	-23	25.9	68.1	46.2
St. Ignatius (1909-1960)	103	-36	25.1	67.6	46.0
Haugan (1912-1966)	107	-49	21.3	62.8	42.8
St. Regis (1961-1966)	108	-33	24.5	64.8	44.8
Superior (1914-1966)	108	-39	23.9	67.2	45.9

PRECIPITATION

Station	Yearly Average	Growing Season Average	Per Cent Falling in Growing Season	Wettest Year	Driest Year
Bigfork (1939-1960)	22.01	11.57	53%	28.79 (1951)	16.10 (1952)
Polson (1907-1960)	15.03	8.53	57%	21.90 (1958)	10.17 (1931)
Polson Kerr Dam (1951-1960)	15.28	8.81	58%	19.93 (1959)	10.03 (1952)
St. Ignatius (1909-1960)	15.10	9.31	62%	25.15 (1916)	8.77 (1935)
Round Butte (1941-1960)	12.92	7.66	59%	17.39 (1948)	7.46 (1952)
Swan Lake (1941-1960)	28.19	11.41	40%	37.33 (1959)	17.23 (1952)
Haugan (1912-1966)	31.40	9.67	31%	44.08 (1933)	17.54 (1952)
St. Regis (1961-1966)	23.37	9.45	40%	28.02 (1964)	18.17 (1963)
Superior (1914-1966)	17.60	8.46	48%	23.47 (1927)	7.61 (1931)

HYDROGEOLOGY

Groundwater obtained from wells and springs is widely used in the Lower Clark Fork River basin primarily for domestic purposes and to a lesser degree for livestock, irrigation, public and municipal, and industrial purposes. The abundance, distribution and quality of groundwater is closely related to geological conditions in the basin. The geological history of the area involves long periods of sedimentation, regional uplift, structural deformation, and erosion. During Precambrian time (over 600 million years ago), thousands of feet of sediments were deposited in the basin. Sedimentation probably continued, interrupted only by brief periods of uplift and erosion, throughout the Paleozoic (225 to 600 million years old) and Mesozoic (70 to 225 million years old) time. Widespread regional uplift and structural deformation occurred in early Tertiary time (50 to 70 million years ago) and all the Mesozoic and most of the Paleozoic sediments were removed by erosion. During Pleistocene time (less than 1 million years ago) continental glaciation greatly influenced the basin. Huge ice sheets moved southward from Canada, and a few small areas in the northern portion of the basin were buried beneath thick glaciers. The Clark Fork River near the Montana-Idaho border was blocked by ice at least once and possibly several times, and a huge lake called lake Missoula was formed. The ice dam failed and catastrophic floods resulted. Damming of the Clark Fork River resulted in deposition of layers of finely laminated silt and clay, as much as 300 feet thick over much of the Clark Fork drainage including the Little Bitterroot valley and Camas Prairie. Wave cut beaches and glacial deposits indicate the maximum altitude of water in ancient Lake Missoula was about 4200 feet above sea level.

Local alpine glaciation left small morainal deposits along many smaller valleys in the mountain ranges. Mountains in the area are almost entirely composed of Precambrian, metamorphosed sedimentary rocks consisting of quartzite, limestone, and argillite. These rocks typically have been structurally deformed and have been subjected to folding, faulting and a low grade regional metamorphism. The Precambrian bedrock deposits generally will yield small quantities of water to wells. If extensive fractured zones are encountered by wells, the yields of the wells will be significantly higher.

Almost all major valleys in the basin contain deposits of Pleistocene age which cover much of the underlying bedrock. These glacial till deposits consist of unsorted and compacted mixtures of gravel, sand, silt, and clay, as well as stratified material forming glacial outwash and buried channel deposits, terrace gravels and lakebeds. Wells drilled into glacial deposits very widely in yield. Some wells yield little water in the compacted glacial materials, whereas other wells drilled into sand and gravel deposits yield over 1,000 gallons per minute. Terraces or benches composed of sand and gravel with some silt and clay are typically present along the Clark Fork River, the St. Regis River Valley and other larger streams within the basin. In general, tributary streams have disected the terraces, allowing them to be drained. Consequently little water can be expected from the higher terrace deposits. Low-level terraces are much more extensive, relatively undisected and will commonly yield five to 50 gallons per minute to properly located wells.

The majority of the shallow wells in Mineral County obtain water from recent alluvial floodplain deposits adjacent to the major rivers in the basin. These sediments are composed of stream deposited silt, sand and gravel and are readily recharged by nearby rivers.

Pollution of groundwater has occurred in several areas in the Lower Clark Fork River basin. Probably the most severe area of pollution is in the vicinity of the waste storage ponds of the Hoerner-Waldorf Corp. near Missoula, Montana. Wastes from these ponds have percolated into the groundwater system and have polluted an area along the Clark Fork River in the vicinity of the ponds. Other specific groundwater pollution problems that have been identified in the basin are seepage of wastes from industrial disposal lagoons in the Missoula area and spills of gasoline from gasoline storage facilities in the Missoula area. Sewage stabilization lagoons generally have seepage into groundwater and create localized areas of groundwater pollution. With the exception of the sewage lagoon in Pablo, there have been no problems due to lagoon seepage reported in the basin. There are 16 sewage lagoons in the basin. Effluents from septic tanks and cesspools can create localized areas of groundwater pollution. Where there are large numbers of septic tanks and individual water supplies using wells, groundwater pollution can lead to public health problems if the wells and septic tank systems are not properly designed and located. Such problems have been tentatively identified in several areas of the basin including Corvallis, Victor, Lolo and the Daly Acres subdivision of Hamilton, all in the Bitterroot drainage, and in Plains and Arlee. The overall impact of septic tank systems has not been thoroughly investigated.

SOILS

Soils of the Lower Clark Fork River basin show great variation in their chemical and physical properties due to variation in climate, topography and the effects of alpine glaciation. Extensive areas in the northwest part of the river basin have been covered with volcanic ash. This may be mixed with weathered products of other rocks or soils or with local alluvium.

At the higher elevations, acidic soils have developed over granite rocks of the Idaho Batholith and over the Precambrian rocks of the Belt Series. Many of these soils have fractured rock, within one meter of the surface. In some areas deposits of volcanic ash have influenced development of some soils. The ashy layer may be only a few inches thick or several feet deep. Ash deposits appear to be thicker on lee slopes and northern exposures. The presence of ash increases the soils water holding capacity. Relatively weak soil structure would contribute to a high erosion hazard, especially on steep slopes. Timber production, watershed protection, recreation, and wildlife are the principle land uses of these soils.

Along the Lower Clark Fork River, well drained soils have developed on outwash deposits. Subsoils have from 35 to 85 percent coarse fragments mixed with sandy loam material. Deep soils having clay subsoil with a stratified silt and clay substratum have developed on glacial lake deposits. Timber production is the predominant land use, but some areas have been cleared for pasture and hay,

Gravelly loams have developed on thin deposits of alluvium over calcareous sediments in the upper part of the river basin. Lime deposits can be encountered at about 15 inches. Sandy loams developed on non-calcareous sandy alluvium along rivers and streams. They tend to be droughty.

The higher benches of the Bitterroot Valley have been manteled with wind deposited silt or strongly weathered granitic outwash. Gravelly or cobbly loams and sandy loams have developed on the benches. Livestock raising is the principal use of these soils. Hay is raised in the irrigated areas and apple orchards were numerous earlier in this century.

Very slowly permeable claypan soils have developed in varved clayey lakebed sediments in the Little Bitterroot and the Flathead River areas. The subsoil is clay which is hard when dry and alkaline in many cases. There very slow permeability makes these soils highly susceptible to erosion from surface water runoff. Light colored silty or clayey soils are found along the Flathead River breaks. Water erosion is a severe hazard.

Well-drained soils containing a high percentage of rock fragments are found in the same area. Susceptibility to surface runoff is greatest during the season the surface is frozen. These soils are used primarily for grazing.

The preceding soils information was derived from References 3,4,5,6,7 and 8. (See Section XV).

LAND USE

The Lower Clark Fork River basin comprises an area of 8,900 square miles or 5,696,000 acres. This area includes 1,900 square miles of the Flathead River basin below Flathead Lake, 2,800 square miles of the Bitterroot River drainage, and all of the Clark Fork drainage below the Blackfoot River. A portion of the basin is occupied by the Flathead Indian Reservation and approximately 60% of the area is in federal ownership, mostly national forest land.

Irrigated cropland utilizes nearly 280,000 acres of land in the basin, while another 120,000 acres produces crops from dryland. Urban and builtup areas cover approximately 68,000 acres. Primary irrigated crops grown are hay for forage and pasture for grazing. Some potatoes and corn are grown, primarily in the Lake County portion of the basin. Wheat, barley, oats, and hay are the principal dryland crops grown in the basin.

The Flathead Indian Reservation includes approximately 1,200,000 acres of land in the basin, extending over much of Lake and a portion of Sanders, Missoula, and Flathead counties. The reservation includes the largest irrigation project in the basin, operated by the Bureau of Indian Affairs, and utilizing water from the Mission Mountain Range and the Flathead River.

WATER USE

The largest water user in the basin is irrigation to produce hay for livestock production. Some of the irrigation has been developed privately by individuals and small groups, but the largest portion exists through federal assistance projects. The Flathead irrigation project, developed by the Bureau of Indian Affairs and the Reclamation Service beginning in 1907, utilizes a highly interrelated complex of nine storage reservoirs, two pumping plants and the Pablo Feeder Canal to provide nearly 115,000 acres with irrigation water. Annual diversion requirements for irrigation in the planning area approach 1.6 million acre feet of water annually with a net depletion of 760,000 acre feet per year.

Municipal water use is estimated as 30 million gallons per day, 12.5 mgd from groundwater, and 17.5 mgd from surface water. Yearly water use from public water systems approaches 34,000 acre feet per year. Rural water use is primarily obtained from groundwater sources and approaches 3.4 million gallons per day or 3,800 acre feet per year. Livestock water use is 2.2 million gallons per day or 2,400 acre feet per year.

Primary use of water for industry is in the Missoula area. Much is supplied from the municipal system, but a large amount is also self-supplied by user industries from both surface and groundwater sources. An estimate 19.5 mgd or 22,000 acre feet per year is used for industrial purposes.

The average annual flow of the Clark Fork at Missoula is 3,872,000 acre feet increasing to 15,920,000 acre feet near the Idaho-Montana border. The Flathead River contributes the major portion of this increase, having an average yearly flow at Polson of 8,469,000 acre feet. Other large rivers of the basin include the St. Regis and Thompson Rivers.

There are two hydroelectric plants on the mainstem Clark Fork; Thompson Falls and Noxon. The two have a combined generation capacity of 260 megawatts.

POPULATION AND ECONOMY

The Lower Clark Fork (of the Columbia)Basin, on the western border of Montana, is made up of Ravalli, Mineral, Sanders, and parts of Lake, Missoula, and Flathead counties. The 1970 population in the basin was 86,474 with 29,497 considered urban and 56,973 rural by the U.S. Census. Only Missoula is determined to be urban by the Department of Commerce. The 1970 populations of communities with over 100 people are listed in Table II.

TABLE II LOWER CLARK FORK - COMMUNITIES OF 100 OR MORE PERSONS

COMMUNITY	COUNTY	1970 POPULATION
Stevensville	Ravalli	829
Victor	Ravalli	300
Corvallis	Ravalli	400
Hamilton	Ravalli	2,499
Darby	Ravalli	583

Table II Cont.

COMMUNITY	COUNTY	1970 POPULATION
Superior	Mineral	993
St. Regis	Mineral	475
Arlee	Lake	100
Ravalli	Lake	100
St. Ignatius	Lake	925
Charlo	Lake	187
Ronan	Lake	1,347
Pablo	Lake	250
Lolo	Missoula	1,500
Milltown	Missoula	700
Missoula	Missoula	29,497
Frenchtown	Missoula	175
Alberton	Mineral	363
Dixon	Sanders	150
Paradise	Sanders	250
Plains	Sanders	1,046
Hot Springs	Sanders	675
Thompson Falls	Sanders	1,356
Trout Creek	Sanders	200
Noxon	Sanders	300
Marion	Flathead	150

TABLE III LOWER CLARK FORK BASIN - POPULATION AND EMPLOYMENT
Historical and Projected - 1930-1935 (1)

	1930	1940	1950	1960	1970	1980	1985
Population	42,961	56,204	62,550	70,846	86,474	97,211	103,191
Employment	17,380	18,551	22,195	24,354	30,839	34,442	36,604

(1) Projection based on historical trends only.

About 15 percent of the land area is devoted to agriculture, with the average farm comprising about 600 acres. One-third of the crop and pasture land is under irrigation. About one-fourth of the farms are under 50 acres and one-fourth are part-time farms. Under 5 percent of farms in the basin had, in 1969, sales of $40,000 or more. As for Montana as a whole, about two-thirds of farm receipts are traceable to livestock and livestock products. Hay is the most frequently grown crop. Employment in agriculture has declined from 5,000 in 1930 to 1946 in 1970 and comprised 28 percent of the total employment in the basin then, compared to 6.3 percent now. Table IV illustrates current employment by gross sectors in 1970.

TABLE IV LOWER CLARK FORK BASIN - EMPLOYMENT BY GROSS SECTORS (1970 data)

Sector	Number	Percent of Total
Agriculture	1,946	6.3
Forestry & Fisheries	1,259	4.1
Mining	60	0.2
Construction	1,759	5.7
Manufacturing	4,078	13.2
Services & Other	21,740	70.5
	30,842 (1)	100.0

(1) Does not total 30,839 due to rounding.

The service category reflects the concentration in education with the University of Montana located in Missoula. Trade is another area of service expansion, making up over one-third of total employment in the study area. Missoula is western Montana's main trade center. In 1930, the entire services sector made up 30 percent; in 1970, that portion has increased to 70.5 percent.

Increasing population and employment trends are projected to continue into the future (at a rapid rate compared to the rest of Montana). The amenities of life seem to be more important in this portion of the state, as a lower labor force participation rate prevails here than elsewhere. Ravalli County, particularly, has a large number of people who have retired young and settled in the area regardless of employment opportunities.

BIOLOGICAL CONDITIONS

Cutthroat trout are found throughout the Lower Clark Fork River basin and are most abundant in mountain lakes and small tributaries. Rainbow trout, brook trout and to a lesser extent, dolly varden and brown trout are also present through the basin. Mountain whitefish are most abundant in the larger rivers, but are occasionally present in some small tributaries. There are a few lake whitefish in the extreme lower basin. Lake trout are confined to McGregor Lake while kokanee salmon are present only in the Thompson and McGregor Lakes. The slimy sculpin is in streams and rivers throughout the basin. Burbot have recently been introduced into main stem reservoirs in the Lower Clark Fork.

Several other fish are found associated with the cold water species but are more tolerant of warm water temperatures. These include longnose sucker, largescale sucker, yellow perch and four species of minnows. There are a few northern pike in the Clark Fork and Lower Flathead River. Warm water species including largemouth bass, pumpkinseed, sunfish and northern black bullhead have been introduced and are still present in a few habitats. Muskrat are locally abundant in various marshes and ponds and are occasionally found along streams and rivers. Beaver are only occasionally found along

the Clark Fork and Flathead Rivers but are common in the smaller tributary streams. Mink and river otter are scattered along the major river floodplains.

A variety of waterfowl inhabit or are seasonally found in the basin. The most common of these are the Canada goose, mallard, bufflehead, goldeneye and mergansers. The most common shorebirds seasonally frequenting the basin are killdeer, common snipe, yellowlegs and various sandpipers.

Heron rookeries are occasionally found along the riverbottoms. Osprey and bald eagles are sometimes observed fishing waters in the basin.

In general, water quality from a fishery standpoint can be considered good throughout the basin with only a few exceptions. Clark Fork River water quality has been periodically degraded by sediment, flushed from Milltown Dam. Sediment deposition behind the dam causes problems with equipment and power generation. In the past, this sediment was periodically flushed downstream. Fish kills and damage to aquatic invertebrates have been documented during these operations (Ref. 9,15,16). The sediment was toxic primarily due to toxic metals from past and present mining operations in the upper drainage. The Milltown Dam problems are discussed in more detail with industrial discharges, on Page 31 of this report.

Wastewater discharges from the sewage treatment facilities, storm drains, and kraft mill at Missoula have an impact on water quality (Ref. 14,17,19) and aquatic life in the Clark Fork River. The flavor of fish flesh is degraded by discharges from the sewage treatment plant and the Hoerner-Waldorf kraft mill (Ref. 16). Early in the history of the kraft mill, at least two fish kills were documented in the river which were believed to have been caused from wastewater discharges (Ref. 16). Various investigations reveal pollution sensitive aquatic invertebrates are somewhat depressed below both discharges, but signs of recovery are noted further downstream (Ref. 9,11,12,13,18). Chronic effects of the kraft mill and the City of Missoula on Clark Fork River biological communities are unknown. Both discharges are on a compliance schedule to install secondary treatment facilities. These improvements will lessen their impacts on aquatic biological communities.

V. MONTANA WATER POLLUTION CONTROL PROGRAM

INTRODUCTION

Water quality management planning is part of a broad, comprehensive water pollution control program administered by the Water Quality Bureau of the Environmental Sciences Division of the Montana Department of Health and Environmental Sciences. Details of this program are described in annual reports of the bureau. Important elements of the state program are:

1. State and federal waste discharge permit programs.

2. Water quality standards.

3. Statewide monitoring and surveillance.

4. Facilities construction grants, plan review, operation and maintenance inspections, training and licensing of operators.

5. Public participation.

6. Enforcement.

STATE AND FEDERAL WASTE DISCHARGE PERMIT PROGRAMS

The present state program of issuing waste discharge permits is operated under the authority given by the Montana water pollution control law and the Montana Pollutant Discharge Elimination System (MPDES). At the present time, the U. S. Environmental Protection Agency (EPA) is also issuing waste discharge permits in the state of Montana to federal facilities and to discharges, from other than incorporated communities, on Indian reservations. The permits are being issued pursuant to the National Pollutant Discharge Elimination System (NPDES) created by the Federal Water Pollution Control Act Amendments of 1972 (FWPCAA of 1972). To eliminate the duplication of effort which formerly existed, the state of Montana applied for and received authority from EPA to issue NPDES permits in Montana. Section 402

of the FWPCAA of 1972 provides that states with adequate water pollution control programs may apply for and receive authority from EPA to issue discharge permits under the NPDES in their own states. Montana made the necessary revisions to the state water pollution control laws during the 1973 legislative session to provide statutory authority for administration of the NPDES program in Montana. The Montana Department of Health and Environmental Sciences was given the authority to administer the waste discharge permit program on June 10, 1974. Waste discharge permits issued under the NPDES prior to the MPDES permit program will serve as MPDES permits until their date of expiration. All MPDES permits issued meet the minimum requirements of the EPA for NPDES permits.

The Federal Water Pollution Control Act Amendments of 1972 established the following time schedule for upgrading waste treatment facilities:

MUNICIPALITIES

1. Secondary treatment by July 1, 1977.
2. Best practical control technology by July 1, 1983.
3. No discharge of pollutants by 1985 (goal)

INDUSTRIES

1. Best practicable control technology by July 1, 1977.
2. Best available control technology by July 1, 1983.
3. No discharge of pollutants by 1985 (goal).

NATIONAL SECONDARY TREATMENT REQUIREMENTS (FWPCAA OF 1972)

Minimum five-day biochemical oxygen demand (BOD_5) reduction of 85 percent.

Minimum suspended solids reduction of 85 percent.

Maximum effluent BOD_5 of 30 mg/l on monthly average and 45 mg/l on weekly average.

Maximum effluent suspended solids of 30 mg/l on monthly average and 45 mg/l on weekly average.

Maximum effluent, fecal coliform, of 200 organisms/100 ml on monthly average and 400 organisms/100 ml on weekly average.

pH limits on effluent maintained between 6 and 9.

Self-monitoring of these parameters is required. The frequency of monitoring is based on the population served and the complexity of the treatment facility and is stated in the NPDES or MPDES permit. In addition, some municipal dischargers are limited for and required to monitor effluent oil and grease.

WATER TREATMENT PLANT TREATMENT REQUIREMENTS

There are no parameters specified by the FWPCAA of 1972 to be monitored for water treatment plant discharges. The following requirements are being placed on NPDES permits issued in Montana:

1. No change in operating procedures will be allowed that would result in a less desirable discharge.

2. As soon as practicable, but no later than July 1, 1977:

Total suspended solids (TSS)	<45 mg/l weekly average <30 mg/l monthly average
Total dissolved aluminum	1.0 mg/l monthly average <1.5 mg/l grab sample
pH	Maintained between 6.0 and 9.0

INDUSTRIAL BEST PRACTICABLE CONTROL TECHNOLOGY REQUIREMENTS (FWPCAA OF 1972)

Industrial waste dischargers will be required to provide the best practicable control technology currently available in treatment of their waste discharges. The parameters will be limited and monitored, and the frequency of monitoring will vary with the different types of industries. The specific parameters to be limited and monitored and the frequency of monitoring are stated in the NPDES or MPDES permit.

AGRICULTURAL TREATMENT REQUIREMENTS (FWPCAA OF 1972)

Federal animal confinement permit requirements, under FWPCAA of 1972, have been modified from time to time and are based on the size of the facility, in animal units. However, the State requirements for obtaining the same kind of permit have uniformly been more stringent and therefore supercede the federal requirements. In essence, the State regulations place no minimum size requirement on a livestock facility, and waste discharge permits are required of any such facility which has an existing or potential discharge to State waters.

The waste discharge permits issued for animal confinement facilities will generally prohibit any discharge of pollutants unless rainfall in excess of the 10-year/24-hour rainfall or equivalent moisture has been received.

Irrigation return flows will be subject to MPDES permit if there is a point source discharge through a man-made or man-maintained drainage system from 3,000 or more irrigated acres. The parameters to be monitored and the frequency of monitoring will be stated on the discharge permit.

WATER QUALITY STANDARDS

Water pollution control started in Montana in 1907 with passage of legislation designed to protect domestic water supplies. A more comprehensive law was passed in 1955 that dealt with control and protection of water for recreation, agriculture and industry. The 1955 law also established a water pollution control council and charged it with the tasks of classifying all streams in the state according to their most beneficial uses and establishing water quality criteria for the streams. The 1955 law also involved upgrading the treatment of wastes going into the streams. Montana thus became one of the first states to have enforceable stream classifications.

In 1965, the U.S. Congress passed the Federal Water Quality Act which required that all states classify and establish water quality criteria for their interstate streams by July 1, 1967. Montana revised its standards for both interstate and intrastate waters and required a higher degree of stream quality than before. Secondary treatment or the equivalent was required of municipal and industrial discharges. In October, 1972, the Federal Water Pollution Control Act Amendments were passed expanding the authority of the Environmental Protection Agency. Uniform water quality standards and enforcement procedures throughout the United States became the objective. Montana revised its water quality standards and adopted these revised standards on July 13, 1973. The new standards became effective in November, 1973.

Montana water quality standards serve as a functional tool in protecting water quality; however, a number of laws, statutes and regulations complement the water quality standards and significantly assist in protecting water quality.

STATEWIDE MONITORING AND SURVEILLANCE PROGRAM

Prior to 1972, Montana had done little water quality monitoring due to inadequate funding. With increased appropriations provided by the 1971 legislature and the federal government, the state greatly increased its effort. Personnel were added to the staff and laboratory capabilities were expanded. The present state monitoring program includes compliance monitoring of point sources of wastes including monitoring of municipal and industrial wastes, long-term baseline monitoring of streams, and a statewide program for determining the general quality of all significant surface waters.

The statewide inventory of water quality will identify areas with water quality problems and will provide basic data for water quality management and planning programs. Included in the monitoring is a statewide assessment of the trophic (pollution level) status of Montana's lakes, reservoirs and ponds. This program is coordinated with the EPA National Eutrophication Survey.

FACILITIES CONSTRUCTION, OPERATION AND MAINTENANCE

A minimum requirement of primary treatment for all domestic sewage was first adopted by the Montana Board of Health in 1952. All of Montana's communities have met this requirement and many of the communities are upgrading their facilities to secondary treatment or are in the process of constructing or planning secondary treatment systems. Since 1956, there has been a federal grant program to assist municipalities in the construction of sewage treatment facilities, including outfall and interceptor sewers. In 1971, the Montana state legislature appropriated $4,000,000 to aid municipalities in construction of these same facilities. The 1973 legislature appropriated $1,600,000 to reimburse municipalities that had proceeded with construction since July 1, 1966, without waiting for state grants. With passage of the Federal Water Pollution Control Act Amendments of 1972, 75 percent of eligible project costs are federally financed. Due to a shortage of federal grant funds, a priority system for allocation must be used. The state, under EPA guidance, establishes priorities for proposed waste treatment projects.

An important part of municipal sewage treatment is proper operation and maintenance of facilities after construction is completed. In an effort to improve operation and maintenance, the state has conducted an operators' school each year. During recent years, this school has had about 100 operators attending. The Bureau has one training officer who coordinates various operator training programs and assists operators on operational problems. A quarterly newsletter is published to inform operators of current regulations and to provide information to them on operation.

An operators certification program was established in 1968 following enactment of a law requiring certification of those responsible for the operation of sewage treatment or industrial waste treatment systems.

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PUBLIC PARTICIPATION

Public participation in water pollution control is an increasingly important aspect of the state program. Public hearings are held concerning proposed regulations, water quality management plans and waste discharge permit applications. The state also has an environmental impact statement requirement. These statements are presented to the public for comment, and hearings are conducted on highly controversial issues.

The public also is kept informed by means of a water pollution control advisory council which has been established by law to assist the Water Quality Bureau in preparation of rules and regulations and dissemination of information to interested groups. Similarly, public meetings are attended on request.

ENFORCEMENT

Montana's laws on water pollution basically state: It is unlawful to:

(1) Cause pollution or place materials in a location where they are likely to cause pollution of state waters, and,

(2) Discharge waste material into state waters without a permit from the Department of Health and Environmental Sciences.

Two administrative rules have been adopted by the Board of Health and Environmental Sciences which are the chief elements in Montana's water pollution control program. Montana's water quality standards serve as the primary means for defining pollution, and the Montana Pollutant Discharge Elimination System rule provides the mechanism for authorizing and controlling point source discharges to state waters. Violators of the law, a rule, permit, or order could be subject to injunction, civil penalities up to $10,000 for each day of violation, or criminal penalties with fines not to exceed

$25,000 per day of violation and/or imprisonment for not more than one year for an initial conviction and not more than $50,000 per day of violation and/or imprisonment for not more than two years for subsequent violations. Significant steps were taken in 1974 to establish a workable enforcement program, including increasing the legal staff and additional allocation of technical staff.

VI. WATER POLLUTION SOURCES

Water pollution in the Lower Clark Fork drainage basin is caused by several factors including municipal and industrial discharges, agricultural effects, mining and non-point sources. In addition, natural water quality problems occur seasonally from runoff associated with erosion. Characteristics of significant municipal and industrial discharges are summarized in Tables V and VI.

Information relative to all municipal and industrial waste discharge permits is given in Section IX of this plan. For the following discussions, the term "Secondary Treatment", whether applied to industrial or municipal discharges; is defined as follows:

AVERAGE ALLOWABLE EFFLUENT CONCENTRATION (mg/1)

Parameter	30 Consecutive Day Period a/	7 Consecutive Day Period b/
BOD_5	30	45
Total Suspended Solids	30	45
Fecal Coliform (Number/100 ml) c/	200	400

Additional effluent limitations are:

1. Total residual chlorine concentration shall not exceed 0.5 mg/1 in any grab sample.

2. No visible oil or grease or floating solids in the discharge. pH units shall remain between 6.0 and 9.0 d/

3. Arithmetic mean of the total BOD_5 and the Total Suspended Solids concentrations for effluent samples collected in a period of 30 consecutive days shall not exceed 15 percent of the arithmetic mean of the concentrations for influent samples collected at approximately the same times during the same period (85 percent removal).

a/ This is in addition to the concentration limitations of total BOD_5 and Total Suspended Solids. a/ For compliance purposes, this limitation shall be determined by the arithmetic mean of a minimum of three (3) consecutive samples taken on separate weeks in a 30-day period (minimum total of three (3) samples); not applicable to fecal coliforms - see footnote c/.

b/ For compliance purposes, this limitation shall be determined by the arithmetic mean of a minimum of three (3) consecutive samples taken in a 7-day period (minimum total of three (3) samples); not applicable to fecal coliforms - see footnote c/.

c/ For compliance purposes, averages for fecal coliforms shall be determined by the geometric mean of a minimum of three (3) consecutive grab samples taken during separate weeks in a 30-day period for the 30-day average, and during separate days in a 7-day period for the 7-day average (minimum total of three (3) samples).

d/ For compliance purposes, any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

MUNICIPAL DISCHARGES

Several communities in the study basin discharge treated sanitary wastewater to adjacent streams (Figure I and Plate I). Individual municipal treatment facilities for the sewered communities in the Clark Fork River basin are discussed as follows:

Missoula Sewage Treatment Plant

Approximately 28,000 persons are presently served by the Missoula Sewage Treatment Plant, which has a design capacity of about 8 mgd. Present flows average about 4.3 mgd with peak flows at about 7.2 mgd. This system is being upgraded from a primary plant to a secondary treatment facility. The new sewage plant will consist of an activated sludge type treatment plant, which is expected to meet secondary sewage treatment requirements. Discharge from the Missoula sewage plant is to the mainstem Clark Fork River in Missoula.

The Missoula sewage treatment plant discharge permit calls for upgrading to secondary treatment by May 31, 1975, but delivery of necessary parts for the final portions of construction will probably delay this date until late fall of 1975. After the new plant is placed in full operation, the following limitations will be effected in addition to the standard secondary treatment listed above:

BOD_5 < 908 lbs/day; TSS < 908 lbs/day; Oil & grease < 10 ppm

Sludge is treated in anaerobic digesters with eventual disposal to drying beds and finally to fields.

Superior Sewage Treatment Plant

The sewage from the town of Superior is treated in a two cell 2.4 acre sewage lagoon, aerated with compressed air. Effluent from the Superior lagoon flows into the mainstem Clark Fork River, just downstream of the townsite.

Present limitations on the effluent from the Superior sewage system include pH between 6 and 9, and BOD less than 50 ppm. A compliance schedule of July 1, 1977 requires secondary treatment.

Lolo RSID #901, Sewage Treatment Plant

Approximately 200 connections are served by the 250,000 gpd capacity Can-Tex package aeration plant serving the Lolo RSID #901 complex. The effluent from the package plant flows into two, one-acre lagoons on the bank of the Bitterroot River. No discharge from this fairly new system has occurred, but it is expected to in the future. Sludge is discharged to drying beds, and thereafter is disposed of on fields. The compliance schedule for the Lolo sewage plant calls for standard secondary treatment as defined above by July 1, 1977. The secondary requirements would apply only during periods of discharge. Until the compliance date, the present limits are pH between 6 and 9, BOD the same as secondary defined above and chlorine residual less than 0.5 ppm.

Hamilton Sewage Treatment Plant

The Hamilton sewage treatment plant consists of a 0.9 mgd primary sewage plant, including a communitor, clarifier, digester and chlorine contact tank. The discharge enters a 1-acre overflow channel reveted off as a polishing pond along the banks of the Bitterroot River. Following anaerobic digestion sludge is placed in drying beds, and thereafter disposed of as soil conditioner on fields per local demand. Infiltration into the sewage system is a problem and flows as high as 2 mgd have been measured.

The discharge from this sewage plant presently has the permit limits of pH between 6 and 9 and chlorine residual less than 0.5 ppm. A compliance schedule of July 1, 1977 calls for secondary treatment.

Darby Sewage Treatment Plant

The Darby plant consists of a one-cell, four-acre sewage lagoon, which overflows into a long narrow ditch, and discharges to the Bitterroot River only during high water. Present limitations on the discharge require a pH between 6 and 9, and BOD less than 50 ppm. A compliance schedule for June 30, 1977 requires secondary treatment.

Stevensville Sewage Treatment Plant

The Stevensville sewage treatment plant consists of a one-cell, 10 acre stabilization lagoon, which discharges to an overflow channel of the Bitterroot River approximately one-half mile west of town. Present limitations on the discharge from the plant include pH between 6 and 9, and no visible oil or grease. A compliance schedule (submitted by Stevensville) requires standard secondary treatment by July 1, 1976.

Alberton Sewage Treatment Plant

A two-cell Hinde aerated lagoon serves an estimated 350 persons connected to the Alberton sewage system. Discharges from the sewage plant occur seasonally, usually during the spring runoff period. Present limitations in effect during periods of discharge include pH between 6 and 9, total suspended solids less than 60 ppm, and BOD less tha 50 ppm. A compliance schedule requires secondary treatment by July 1, 1977.

Polson Sewage Treatment Plant

A two-cell, 25 acre stabilization lagoon serves an estimated 2,000 persons connected to the Polson sewage system. Discharge from the facility is to the lowermost end of Flathead Lake just above Kerr Dam. A considerable flow in this portion of Flathead Lake sweeps the discharge downstream, so the effects of the discharge on Flathead Lake are minimal. A compliance schedule of July 1, 1977 calls for seondary treatment to be achieved at this treatment plant.

Ronan Sewage Treatment Plant

A two-cell stabilization lagoon, with a total area of 17.5 acres, serves a population of 1600 persons. Design population is approximately 1,500. Discharge is through a series of small irrigation ditches and streams which eventually enter Crow Creek south of Ronan. Present permit limitations on the Ronan discharge include pH between 6 and 9, total suspended solids less than 60 ppm, BOD less than 50 ppm and no visible floating solids or oil and grease. A compliance schedule for July 1, 1977 requires secondary treatment.

Pablo Sewage Treatment Plant

The new sewage treatment plant for the town of Pablo consist of 3 cells of stabilization lagoons, designed on a non-overflow basis. At present, this new system has not filled with sewage, and in the future is not expected to discharge. No discharge permit has been issued for this plant.

Charlo Sewage Treatment Plant

At the town of Charlo, a one-cell, three-acre sewage lagoon serves approximately 300 persons. Effluent from the Charlo sewage lagoon discharges into a swampy area eventually served by ditches and irrigation canals, which are not easily traceable, but which apparently enter Mission Creek several miles to the south. Present limitations on the Charlo sewage effluent require a pH between 6 and 9, and BOD less than 50 ppm. A compliance schedule for July 1, 1977 requires secondary sewage treatment.

Camas Hot Springs Sewage Treatment Plant

A small secondary sewage treatment plant serves the community of Camas Hot Springs. This plans consists of a primary clarifier, an aeration chamber, a secondary clarifier and a large cold digester. Infiltration and inflow into the sewage system is a significant problem in this community. Present limitations on this discharge call essentially for standard secondary treatment as defined above, except that there are no limitations on coliform concentrations, or chlorine residuals. However, due to infiltration and operational problems, the plant is not expected to meet the present limits or the compliance schedule of July 1, 1975. It is expected that a revised permit will be issued, changing the compliance date to July 1, 1977 and changing the effluent requirements to secondary treatment. Sludge is presently pumped from the digester to drying beds and is thereafter disposed of as soil conditioner.

St. Ignatius-B.I.A. Sewage System

Approximately 200 persons are served by the St. Ignatius-B.I.A. sewage system, which provides for the south part of the town. Treatment consists of a two-cell lagoon, with each cell having two acres. Overflow from this sewage system moves westerly into a marshy area, which is eventually tributary to Mission Creek, although drainage patterns are not well defined. The waste discharge permit for this community specified secondary treatment. No compliance date has been specified in the permit, although it is assumed that the standard requirement of July 1, 1977 applies.

St. Ignatius-Municipal System

An estimated 1,000 persons are served by a one-cell, 5-acre lagoon, serving the north portion of St. Ignatius. The sewage lagoon is located west of town and discharge is westerly into a marshy area, eventually tributary to Mission Creek. Present limitations on the discharge from this system include pH between 6 and 9 and BOD less than 50 ppm. A compliance schedule for July 1, 1977 requires secondary treatment.

Kicking Horse Job Corps, near Ronan

Sewage from a population of approximately 350 persons is treated in a 3-cell stabilization lagoon. The sizes of the individual lagoons are approximately 1.7, 1.5 and 0.6 acres. Intermittent discharge from this lagoon system is to the Kicking Horse Feeder Canal, immediately upstream of Kicking Horse Reservoir. At present there is no discharge permit for this facility, although application is pending. This is a federal facility and the permit would be issued by the U.S. Environmental Protection Agency.

Dixon Agency Sewage Treatment Plant

A population of approximately 100 persons is served at Dixon Agency by a two-cell sewage lagoon. These cells are approximately 0.3 acres each. Normally, there is no discharge from this system. As such, no waste permit has been issued or compliance schedule established. Due to the small size of the system, it is felt that seepage may be a problem into a nearby slough, but this remains to be verified.

Town of Dixon, Sewage Treatment Plant

A new 3-cell stabilization lagoon serves the small community of Dixon, located near the confluence of the Jocko River and the Flathead River. The surface area of the three cells totals about 5.6 acres and the system is designed on a non-overflow basis. At present, only the first cell and a portion of the second cell have filled with sewage, and no effluent is anticipated. No discharge permit and no compliance schedule is required for this sewage system.

Thompson Falls Sewage Treatment Plant

A single cell, 5 acre stabilization lagoon serves the community of Thompson Falls. Although an overflow structure to the Clark Fork River exists, this stabilization lagoon has never filled with water and seeps readily through the bottom of the lagoon. In the event of discharge, the limitations placed on this system are pH between 6 and 9 and BOD less than 50 ppm. A compliance schedule for July 1, 1977 requires secondary treatment.

Thompson Falls Dam Sewage Treatment Plant

A small Bio-Pure package aeration sewage treatment plant serves a very few users in the vicinity of the generating plant and the foreman's residence at Thompson Falls Dam. Dischargeis to the Clark Fork River near the Dam. As this small sewage plant is thought to meet secondary sewage treatment requirements, no compliance schedule has been established and present limitations are secondary treatment. Solids concentrations in the mixed liquor are controlled by occasional wasting via septic tank pump truck with final disposal at approved dump sites.

TABLE V . CHARACTERISTICS OF MUNICIPAL DISCHARGES

WASTE SOURCE AND LOCATION (1)	WASTE SOURCE IDENTIFICATION DATA: TREATMENT TYPE	RECEIVING WATER	DISCHARGE PERMIT NO.	DISCHARGE TYPE	DATE(s) SAMPLED	DISCHARGE CHARACTERISTICS (Units are mg/l unless otherwise shown)	
Missoula STP(2) 13N19W18CCD	Activated Sludge	Clark Fork of Columbia R.	MT-0022594	Continuous	1/1/75 to 2/1/75 (3) (4)	Flow: 3.7-5.0 MGD BOD: 35-167 TSS: 31-128	pH: 6.7-7.4 units Fecal Coliform: 0-40/100 ml Cl_2 Residual: 0.1-1.4
Hamilton STP(2) 06N21W25BBB	Primary + Chlorination	Bitterroot River	MT-0020028	Continuous	1/1/75 to 2/17/75 (3)	Flow: 0.28-0.37 MGD BOD: 32-64 TSS: 20-40	pH: 7.0-7.5 Units Fecal Coliform: 79,000-91,000 per 100 ml
Darby STP(2) 03N21W11CDB	Lagoon	Bitterroot River	MT-0021741	Intermittent	10/1/74 to 12/31/74 (3)	Flow: 0.014 MGD BOD: 16 TSS: 62	pH: 8-6 units Fecal Coliform: 15,000/100 ml
Stevensville STP(2) 09N20W27BAC	Lagoon	Bitterroot River	MT-0022713	Intermittent	10/1/74 to 12/31/74 (3)	Flow: 0.32 MGD BOD: 10 TSS: 21	pH; 7.5 Units Fecal Coliform: 57,000/100 ml
Lolo RSID #901, STP(2) 12N20W26ABA	Package Aeration + Lagoon	Bitterroot River	MT-0020168	Intermittent	None	The first discharge from this facility has not yet occurred.	
Superior STP (2) 17N26W34BBB	Aerated Lagoon	Clark Fork of Columbia R.	MT-0020664	Continuous	4/1/74 to 6/30/74 (3)	Flow: 65-70 gpm BOD: 23 TSS: 59	pH: 7.2 Units Fecal Coliform: 200/100 ml
Alberton STP (2) 14N23W03ACA	Aerated Lagoon	Clark Fork of Columbia R.	MT-0021555	Intermittent	5/20/74(5)	BOD: 48 pH: 7.9 Units TSS: 64	Fecal Coliform: 785,000/100 ml (Note: No discharge at time of writing)
Polson STP (2) 22N20W08AA	Lagoon	Flathead Lake at Outlet	MT-0020559	Intermittent	11/28/74 to 1/27/75 (3)	Flow: 0 to 0.48 MGD BOD_5: 24 TSS: 96	pH: 7.7 Units Fecal Coliform: 440/100 ml
Ronan STP (2) 20N20W02CBA	Lagoons	Crow Creek	MT-0021474	Continuous	3/9/75 (3)	Flow: 0.1 to 0.2 MGD BOD_5: 39 TSS: 44	Fecal Coliform: 1,300/100 ml pH(5): 9.8 Units (5/23/74)

TABLE V. (Cont.)

WASTE SOURCE AND LOCATION (1)	WASTE SOURCE IDENTIFICATION DATA			DISCHARGE TYPE	DATE (s) SAMPLED	DISCHARGE CHARACTERISTICS (Units are mg/l unless otherwise shown)	
	TREATMENT TYPE	RECEIVING WATER	DISCHARGE PERMIT NO.				
Kicking Horse Job Corps, near Ronan 20N19W19DBB	Lagoons	Kicking Horse Reservoir	Permit Pending	Intermittent	None	No data available	
Charlo STP (2) 19N20W05CCB	Lagoon	Eventually to Mission Creek	MT-0022551	Continuous	1/15/75 (3)	Flow: 0.024 MGD BOD_5: 12 to 20 TSS: 38 to 44	pH: 7.8 to 7.9 Fecal Coliform: 41,000/100 ml
Camas Hot Springs STP (2) 21N24W03BCB	Activated Sludge	Hot Springs Creek	MT-0020591	Continuous	1/21/75 to 3/13/75 (3)	Flow: 0.12 - 0.22 MGD BOD_5: 19 to 53 TSS: 16 to 19	pH: 6.7 - 7.0 (5) Fecal Coliform: 167,000/ 100 ml (5/13/74)
St. Ignatius BIA STP (2) 18N20W14CAB	Lagoons	Eventually to Mission Creek	MT-0029017	Continuous	5/20/74 (5)	BOD_5: 31 TSS: 116 pH: 7.5	Fecal Coliform: 1175/100 ml Ortho PO_4: 26 Total PO_4: 43
St. Ignatius, Municipal STP (2) 18N20W14ABD	Lagoon	Eventually to Mission Creek	MT-0020524	Continuous	5/20/74 (5) 2/19/75 (3)	Flow: 172 gpm BOD_5: 25-50 TSS: 33-100	pH: 7.6 - 8.3 Units Fecal Coliform: 2500-19,000/ 100 ml Ortho PO_4: 16
Thompson Falls STP (2) 21N29W06ACB	Lagoon	Clark Fork of Columbia River	MT-0021784	Intermittent	None	No discharge to date. While system is designed to overflow, leakage has prevented this from happening.	
Thompson Falls Dam STP (2) 21N29W08BCC	Package Aeration Plant, Small	Clark Fork of Columbia River	MT-0023159	Intermittent	None	No data yet available.	

(1) See Appendix C
(2) STP-Sewage Treatment Plant
(3) Self Monitoring Data Supplied by Discharger
(4) This data taken prior to completion of secondary upgrading. System should be completed by fall of 1975.
(5) State Health Department Analysis of Grab Sample

Ninemile Ranger Station, Sewage Plant

The Ninemile Ranger Station, located near Ninemile Creek west of Missoula, has in the past had a discharge from a septic tank system into the creek. At present a new sewage system is being constructed, consisting of an aerated lagoon with sprayfield for final disposal. As this new system will have no discharge to Ninemile Creek, or any other surface waters, no discharge permit is required and no compliance schedule has been established.

Private, No-Discharge Sewage Systems

In addition to the sewage plants listed above, two small sewage plants exist in the Missoula area, utilized by private entities, and having no discharge to surface waters. These include the El-Mar subdivision-trailer court complex in west Missoula, which utilizes a multiple lagoon system with 3 lagoons, having no overflow. The other is the Evergreen Truck Stop located adjacent to Highway 93 near its junction with Interstate Highway 90 near Missoula and owned by the Standard Oil Company. This facility consists of a package aeration plant without discharge to any surface waters. Effluent is disposed of in drainfield systems. Neither of these two facilities will be required to obtain waste discharge permits, nor will they be issued compliance schedules.

Municipal Water Treatment Plant Discharges

As natural waters are usually of low hardness and generally of good quality, there are no known water treatment plants in the basin.

INDUSTRIAL DISCHARGES

In the Lower Clark Fork drainage basin, there are four industrial discharges presently under state or federal permit. One of these is in the Ronan area, two are in the immediate Missoula area, and one is several miles downstream of Missoula on the Clark Fork River.

These industrial waste treatment facilities are described as follows:

M & S Ready Mix - Now Western Materials Co.

Located about one-quarter mile west of Fort Missoula, the M & S Ready Mix gravel-washing settling pond discharges to an irrigation ditch, tributary to the Bitterroot River. During periods of discharge, the following limitations apply: Total Suspended Solids, instantaneous limit 45 ppm, daily limit 30 ppm; turbidity, maximum of 100 JTU's (Jackson Turbidity Units); oil and grease, maximum 10 ppm; pH between 6 and 9. A compliance schedule for July 1, 1976 requires this industry to meet water quality standards in the Bitterroot River, in addition to meeting the present requirements.

Daily's Meats, Missoula

Records indicate that the present maximum flow from the waste treatment pond serving the Daily's Meat plant is about 0.3 mgd. This industry, located just upstream of the Missoula municipal sewage treatment plant, discharges into the mainstem Clark Fork River. Present limitations on the discharge from the treatment pond include: BOD, daily limit of 550 pounds, instanteous equivalent limit of 825 pounds per day. Total suspended solids, 250 pounds daily limit, instantaneous equivalent limit, 375 pounds per day and pH between 6.5 and 8.5 with no floating solids or foam permitted. A compliance schedule of July 1, 1975 calls for a daily BOD limit of 31 pounds per day, with an instantaneous equivalent limit of 47 pounds per day. The total suspended solids daily limit is 66 pounds per day. Settleable solids must average less than 0.1 ml/l, with a maximum of 0.15 ml/l. Oil and grease, maximum 10 ppm; fecal coliforms, maximum 1000/100 ml. Chlorine residual less than 0.5 ppm, pH 6.5 to 8.5 and no floating solids or visible foam permitted. Proposed improvements in waste treatment would include in-plant controls to reduce both quantity of organic wastes and volume of flow, such that the existing treatment ponds would be more efficient.

Consolidated Dairies, Ronan

The Consolidated Dairies plant in Ronan is primarily a milk transfer site, although butter production and washing facilities cause batch surges of wastewater to Spring Creek located just west of the plant. Cheese production results in whey waste, but this material is now removed for drying and by-product recovery. While the majority of the wastewaters from this plant have been eliminated in the past few years, the remaining wastewaters enter Spring Creek untreated. Present limitations call for no discharge of whey. A compliance schedule of January 1, 1976, places limitations as follows: BOD, average less than 3.1 lbs./day, suspended solids, average less than 3.1 lbs./day. Daily maximum BOD 4.7 lbs./day, daily maximum suspended solids, 4.7 lbs./day. Settleable solids less than 0.1 ml/l, pH between 6 and 9, no floating solids or foam permitted.

TABLE VI. CHARACTERISTICS OF INDUSTRIAL DISCHARGES

WASTE SOURCE AND LOCATION (1)	WASTE SOURCE IDENTIFICATION DATA			DISCHARGE TYPE	DATE (s) SAMPLED	DISCHARGE CHARACTERISTICS (Units are mg/l unless otherwise shown)
	TREATMENT TYPE	RECEIVING WATER	DISCHARGE PERMIT NO.			
Daily's Meats (slaughterhouse and rendering), Missoula 13N19W17CBC	Lagoons	Clark Fork of Columbia River	MT-0000094	Continuous	12/16/74 to 1/31/75 (3)	Flow: 0.01-0.29 MGD BOD_5: 193-217 TSS: 92-177 Oil/grease: 19-25 pH: 6.9 units Tot. Sett. Solids: 0.1-0.4 ml/l Kjeldahl N: 16.6-37.1 Ammonia N: 15.1-26.1 Phosphate: 2.5-6.8 Fecal Coliform: 3900/100 ml
Hoerner-Waldorf Kraft Pulp Mill 14N21W23A	Lagoons, Aerated lagoons, Clarifiers	Clark Fork of Columbia River	MT-0000035	Seepage & Intermittent Discharge	1971 (2)	See Table VII.
M & S Ready Mix (Gravel Washing) Missoula 13N20W36CBD	Settling Ponds	Bitterroot River	MT-0023531	Continuous	(2)	Maximum values: (2) Flow: 1.8 MGD TSS: 232 mg/l pH: 6.8 Units (Note: Flow rate is a spring, and is independent of plant operations)
Consolidated Dairies Ronan 20N20W02DCA	In-Plant Controls	Spring Creek	MT-0000108	Continuous, but flow surges	5/23/75 (4)	BOD_5: 2320 TSS: 940 Fecal Coliform: 31300 Ortho-Phosphate: 133 pH: 9.86

(1) See Appendix C
(2) Information from permit application. Date not specified.
(3) Data supplied by industry in self-monitoring.
(4) State Health Department analysis.

Milltown Dam

Milltown Dam, owned by Montana Power Co., is located about four miles upstream of the city limits of Missoula, and is a run-of-the-river power dam on the Clark Fork River in 13N18W20ADD. Sediments in the resulting backwater are very high in metals concentrations from upstream mining and metal reduction activities at Butte and Anaconda. Core sediment analyses (Ref. 33) have shown zinc and copper concentrations averaging as high as 4900 ppm; manganese as high as 1100 ppm; and iron as high as 39,000 ppm.

Sediments have in the past been flushed downstream, on occasions causing fish kills. In some instances, the sediment release has been intentional as silted forebay areas were hydraulically sluiced clean. At other times, the reservoir was lowered for routine inspections or emergency repairs, exposing the bottom sediments to inadvertent hydraulic river flushing.

Following the last controversial fish kill, the Montana water quality standards were changed, to require operations at dams to minimize water quality problems. Since that time, the cleaning of the forebay has been limited to dredging, with spoils disposed on land. Also sedimentation of the forebay has been at least partially avoided by keeping more generators in constant operation, thus avoiding the quiescent forebay conditions which cause sedimentation.

Hoerner-Waldorf, Pulp Mill Waste Treatment Facilities

The Hoerner-Waldorf pulp mill, approximately 12 miles northwest of Missoula, is a kraft-type pulping mill, located adjacent to the Clark Fork River. Hoerner-Waldorf operates this facility as a standard kraft process pulp mill with liner board carton stock and bleached pulp production capabilities. The major source of raw wood material (chips and sawdust) is waste received from sawmills in the vicinity. The plant also has a round wood processing capability which converts logs of various sizes into digestible chips. Little or no round wood processing is required at this time since the plant's demands are satisfied by the present supply of chips and sawdust.

Pulp production is from a chip fed Kamyr continuous digester, a sawdust fed Kamyr continuous digester and batch fed digesters. Pulp from the continuous digesters is washed and then sent to the liner board and carton stock facility. After bleaching, pulp from the batch digesters is marketed in 500 or 1000 pound bales, or used as finishing surface material in the production of liner board and carton stock. The plant's average daily production of marketable product is 1000 tons of paper board and 150 tons of bleached pulp.

TABLE VII DESCRIPTION OF HOERNER-WALDORF CORP. DISCHARGES

DISCHARGES #001, #002, #003

The applicant reported 1.5 billion gallons of wastewater were discharged through these outfalls in 1971. These wastewaters contained the following average concentrations of pollutants;

DISCHARGE #004

The 5.76 million gallons per day of discharged cooling water are described according to the 1971 date reported by the applicant, as follows:

Self-monitoring data reported by the applicant indicates that during 1973, the maximum temperature of the cooling water discharge (#004) was 80° F. The data also indicated that the temperature averaged approximately 60° F.

DISCHARGES #001, #002, #003		DISCHARGE #004	
PARAMETER	CONCENTRATION	PARAMETER	CONCENTRATION
		Flow	5.76 mgd
BOD_5	306 mg/1	BOD_5	1.2 mg/1
COD	1497 mg/1	COD	12.0 mg/1
Total Solids	2360 mg/1	Total Solids	390 mg/1
Total Volatile Solids	1122 mg/1	Total Volatile Solids	110 mg/1
Total Suspended Solids	97 mg/1	Total Suspended Solids	3.6 mg/1
Total Dissolved Solids	2263 mg/1	Total Dissolved Solids	386 mg/1
pH (units)	8	pH (units)	9.4
Alkalinity	678 mg/1	Alkalinity	233 mg/1
Phenols	0.3 mg/1	Phenols	.003 mg/1
Ammonia	0.5 mg/1	Ammonia	0.4 mg/1
Nitrate	0.4 mg/1	Nitrate	0.2 mg/1
Kjeldahl Nitrogen	4.3 mg/1	Kjeldahl Nitrogen	0.5 mg/1
Total PO_4	0.7 mg/1	Total PO_4	0.34 mg/1
Color	2333 s.c.u.	Color	< 20 s.c.u.
Turbidity	412 t.u.	Turbidity	< 1 t.u.

Seven sources of waste exist within the plant including the following:

1. Non-contact, uncontaminated cooling water, from condensers.
2. Clean water from paper machine save-all, and excess clean water.
3. Pulp waste from digesters, washers, evaporators, recovery boilers.
4. Bleach waste from bleach plant and recaustisizer.
5. Paper production waste from the paper machine.
6. Floor drainage from miscellaneous leakage and spills.
7. Domestic waste from restrooms.

Wastewater from the Hoerner-Waldorf plant is handled in 14 large ponds. These ponds are used for treatment, seepage and sludge handling. Four separate discharge points allow direct discharge to the Clark Fork River. Three of the discharges carry various amounts of contaminants and the fourth discharge is essentially uncontaminated cooling water. Characteristics of the four discharges are shown on the previous page. In the following discussion, discharge #4 refers to the uncontaminated cooling water. Figure 2.

Present limitations require that there be no discharge from outfalls 1,2,or 3, except during the spring high flow period on the Clark Fork River. Discharges will not commence until permission is given by the State Department of Health and Environmental Sciences. Discharge will be terminated when requested orally or in writing by the Department. The allowable rate of discharge is governed by the river flow and the Median Tolerance Limit (toxicity to fish) of the wastewater, according to a formula which appears in the discharge permit. Present effluent limitations on discharge 004, (uncontaminated cooling water) limit the maximum flow rate to 6.0 MGD and the maximum temperature to 90°F. In addition, seepage from the ponds must achieve not less than 85% removal of the BOD.

Interim effluent limitations have been established for the period from July 15, 1975 through February 28, 1977. During this period, the present effluent limitations described above apply, plus the following:

(1) The combined springtime discharge shall not contain more than two million pounds of total suspended solids.

(2) Total annual discharge of BOD in the direct discharge and seepage, combined, shall not exceed 2.25 million pounds.

(3) pH of the discharge shall be between 6.0 and 9.0.

(4) There shall be no discharge of floating solids or visible foam in other than trace amounts. The present effluent limitations continue to apply to discharge 004.

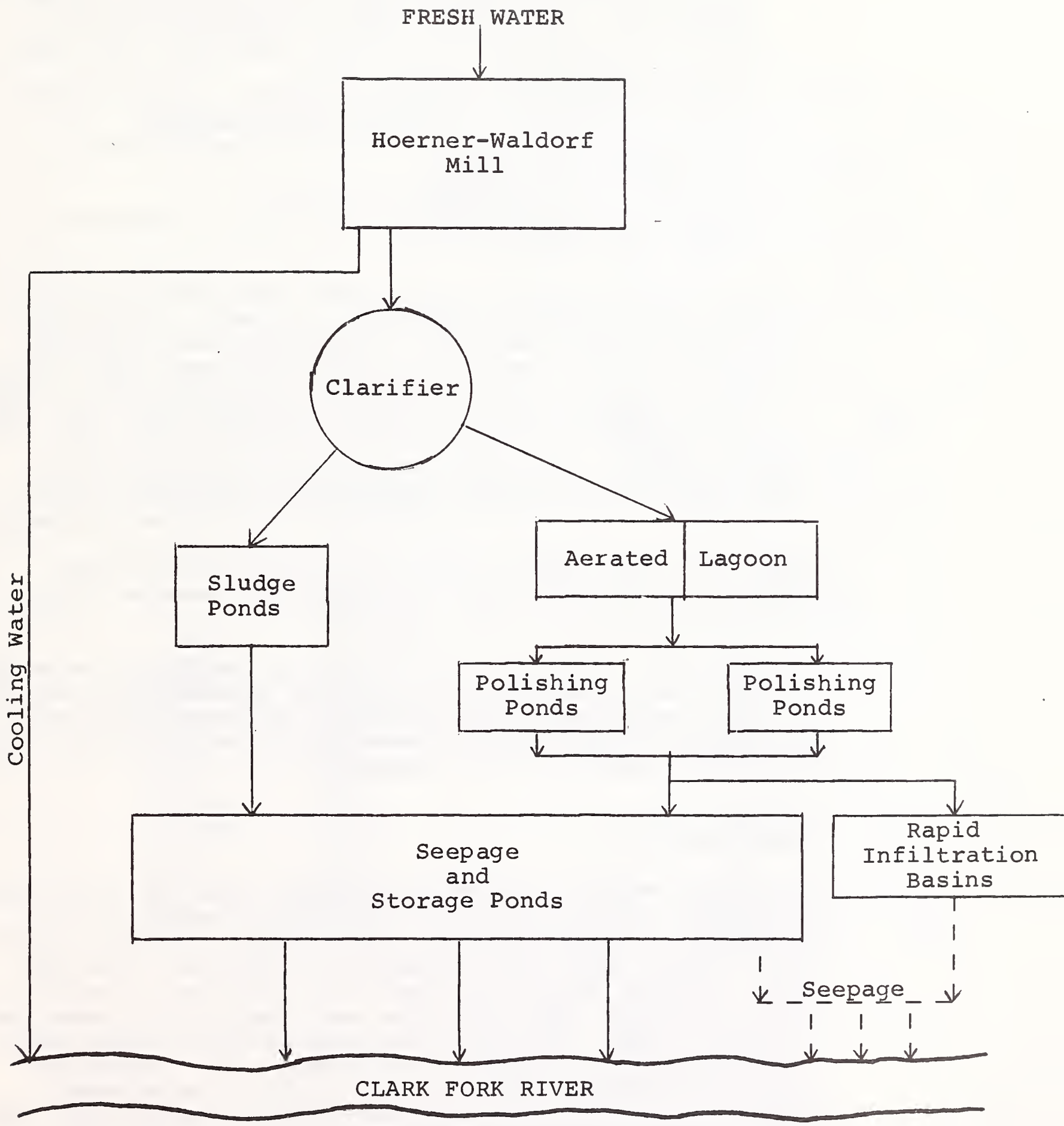


Figure 2. Hoerner-Waldorf's wastewater flow diagram

After March 1, 1977, final discharge limitations will include:

(1) Rate of discharge shall not exceed present limits.
(2) Combined rate of direct discharge shall not exceed a formula in the permit limiting the amount of organic color in the wastewater. This formula relates the discharged organic color to the organic color naturally occurring in the Clark Fork River upstream.
(3) Rate of discharge is further regulated by a formula related to the concentration of the BOD in the discharge.
(4) Total poundage of total suspended solids and BOD are as in the interim regulations.
(5) pH shall be in the range of 6.0 to 9.0.
(6) Should be no discharge of floating solids or visible foam other than in trace amounts.

In addition, uncontaminated cooling water from discharge #4 shall have the same requirements which apply at present. In addition to the requirements noted above, a substantial list of required monitoring is also presented in the waste discharge permit. Prior to surface discharge during the spring runoff period, the monitoring will include measurements of the Median Tolerance Limit, BOD, color, pH, total phosphorus, ammonia, nitrate and nitrite, and total organic nitrogen. This monitoring must be done for each of the ponds containing wastewaters. In addition, each direct outlet (discharges 1, 2, & 3) must be monitored in the following schedule:

daily, flow rate; weekly, Median Tolerance Limit, BOD, total suspended solids, color, pH, total phosphorous, ammonia, nitrate and nitrite, and total organic nitrogen.

In addition to the above, test wells must be tested each two months for BOD, color, and sodium. This required monitoring applies to 8 test wells essentially located downstream of the waste pond sites. In addition, several parameters must be monitored in the main Clark Fork River downstream of the discharge.

MINING ACTIVITY

At present there is little mining activity in the Lower Clark Fork River basin. There is considerable potential, however, for the development of mineral resources, particularly in the West Fork of the Bitterroot River, and in tributaries of the Lower Clark Fork River. Thompson Falls in the Lower Clark Fork River is about 25 miles from Mullan, Idaho, which has been a major mining center for a number of years. One active mine presently extracts and concentrates antimony in the vicinity of Thompson Falls. Feasibility studies are presently underway for the mining of large copper deposits in the Bull Lake area, located between Thompson Falls and Troy. Mineral occurrences are shown on the map of figure 3.

Figure 3 MINERAL RESOURCES AND MINING DISTRICTS CLARK FORK-KOOTENAI-SPOKANE, SUBREGION I (Ref. 2)

United States Antimony Corporation

The U. S. Antimony Corporation operates an antimony mine and concentrator utilizing a floatation process, about 12 miles west-southwest of Thompson Falls near Prospect Creek. Wastewaters from the mine concentrator are treated in two lagoons of two acres total area. These lagoons are located in 49N31W29DD (Appendix C). No surface discharge to Prospect Creek normally occurs from these seepage ponds, although the dikes have been subject to some erosion during runoff periods in the past. No waste discharge permit is required and no compliance schedule has been established for this entity.

Lower Flathead Drainage Basin

The Lower Flathead portion of the Clark Fork drainage basin contains very little in the way of mineral resources, the only known mining facility being a small silver mine located north of Niarada in the Little Bitterroot River drainage. Geology of the Lower Flathead River area consists essentially of unmineralized Precambreian deposits in the hills and mountains, and late Tertiary or Quaternary alluvium in the valley bottoms.

Bitterroot River Drainage

The West Fork of the Bitterroot River contains considerable potential for mining, although little in the way of active mining is evident at the present time. In addition to some gold placer potential in the West Fork, Thorium potential is known to exist in the headwaters areas. Thorium is a potential fuel for generation of nuclear energy. Irregular, low grade mineralization is known to exist in the headwaters of the West Fork Bitterroot River. In addition, an old, small, open pit mine has taken silver from the foothills west of Stevensville. Fluoride has in the past been mined near Darby, although the mine is presently closed. Vermiculite reserves are known to exist east of Corvallis. The potential for large-scale mining in the Bitterroot area will probably be limited to extraction of thorium and vermiculite in the future.

Clark Fork Drainge Below Thompson Falls

In addition to the U. S. Antimony Corporation, the Spar Lake Prospect exists near the headwaters of the Bull River drainage, about seventeen miles northwest of Noxon, MT. The Bear Creek Mining Company, a subsidiary of Kennecott Copper Corp. controls this large mining prospect in the headwaters of Ross Creek, a tributary of Lake Creek which flows into the Kootenai River. American Smelting and Refining Co. is presently exploring on the copper prospect. If a mine is opened at this location it will be accompanied by a mill and concentrator. As ore production may be in the 15,000 tons per day range, water pollution problems could be substantial. If the project is constructed, wastewaters could be discharged into the Clark Fork

drainage basin, or the Kootenai River basin, depending on the location of the concentrator mill site. The proposed mine is located on Mt. Vernon in the Lake Creek-Kootenai drainage, but the Bull River-Clark Fork drainage lies only about 2 1/2 miles to the southeast of the claim area.

Located about 20 miles southeast of the Spar Lake Prospect is the Vermillion River drainage basin, a tributary to the Clark Fork River. Historically, the Vermillion drainage was sluiced for gold rather heavily. At present, numerous claims have been filed presumably for potential copper deposits. In addition, the Vermillion drainage holds possibilities of tungsten, molybdenum, and small amounts of silver and gold. While mining activity in the Vermillion drainage is presently limited to occassional prospectors, this is a potential site for future mining development.

In addition to the specific prospects and claims noted above, there is potential for placer gold in most tributaries of the Lower Clark Fork River. In recent years the price of gold has encouraged individuals to operate small, one-man sluices in tributaries of this area. The result is often considerable turbidity within the streams, and there usually are violations of water quality standards. Enforcement of these problems is difficult, and it is difficult to remove this placer gold without causing turbidity. Such problems are not always reported to the enforcement agencies, and the activity may be in remote areas.

In summary, it is noted that little exists in the way of mining activity in the Lower Clark Fork drainage basin at present. However, there is potential for future development of mineral reserves in both the Bitterroot drainage basin and the Lower Clark Fork drainage basin and its tributaries.

AGRICULTURAL DISCHARGES

Five waste discharge permits for agricultural operations have been issued within the Lower Clark Fork drainage basin, and two more are pending. All seven operations are for confined livestock facilities. All five permits which have been issued make provisions to prevent any discharges to state waters. Confined livestock waste discharge permits are issued by the Montana Department of Health and Environmental Sciences. Other agriculture related discharges include Daily's Meats of Missoula and Consolidated Dairies of Ronan, both of which are discussed in the industrial wastes section of this report. Non-point agricultural discharges are discussed in a following section. Agricultural waste permits in the Lower Clark Fork Basin are discussed on the following pages:

Fieber Swine Operation

Mr. Tom Fieber currently operates a confined swine operation having a capacity for 12 head of swine. This facility is located in the NE¼, NE¼, Sec. 5, T21N., R19W. Lake County, approximately five miles northeast of Pablo, Montana. The livestock are held in total confinement resulting in no surface runoff problem. Waste material will be handled in dry form and disposed of weekly on 30 acres of adjacent pasture. If this operation should be expanded, the permit will be revised and a waste storage lagoon installed. (Permit #F-26-H issued October 16, 1973).

PK Bar Ranch Feedlot

Mr. Peter J. Krudde proposes to construct a confined livestock operation having a capacity for 400 head of cattle. The proposed facility will be approximately four acres in size and will be located 3-3/4 miles north of Plains, Montana, in the NW¼, NE¼, Sec. 11, T20N., R26W., of Sanders County. Surface runoff from the feeding area will be contained in a retention pond, thus eliminating any discharge to state waters. Waste material will be removed from the feedlot at least twice per year. Liquid runoff will be applied to adjacent hayfield as necessary to maintain capacity. (Permit F-27-B issued November 26, 1973).

Laursen Swine Operation

The Laursen Swine Operation proposes to construct an animal confinement facility located in the NW¼, NE¼, Sec. 35, T10N., R20W., of Ravalli County, approximately 3 miles south of Florence, Montana. This operation will have a maximum annual capacity for approximately 1,200 pigs. The livestock associated with this animal confinement facility will be totally confined with buildings on the premises. The operation will consist of farrowing sows and feeding to market weight the pigs which are produced. The waste material which is produced within the building will be scraped daily into a pit located beneath the floor and running the entire length of each building. This waste material will then be periodically flushed to a retention pond located south of the animal confinement facility. Storage capacity exceeds the minimum 120 day storage requirement. The rentention pond will be lined with clay to prevent percolation of this waste material into the groundwater. The waste control facility will be managed such that there is no direct discharge of waste material to state waters. It may be necessary to periodically remove waste material from this facility and dispose of it on adjacent agricultural land. (Permit #MT-0029034 issued February 5, 1975).

Glen Moeller Swine Operation

Mr. Glen Moeller currently operates a confined swine operation of up to 20 sows and litters in the NW¼, SW¼, Sec. 4, T6N., R20W., Ravalli County, near Corvallis, Montana. The sows are farrowed with a building and the waste material absorbed in bark bedding. This

bedding is removed and spread on adjacent crop and hay land. Waste material from the level open lot is periodically removed and spread on the same waste disposal area. Due to the relatively flat topography of the area, there is little possibility of runoff. (Permit No. MT-0029002 issued May 10, 1974).

Kaiser Swine Operation

Mr. Jim Kaiser has operated since 1970 a confined livestock operation having capacity for 14 sows in the farrowing building and 225 head in the finishing unit. The location of this operation is in the SE ¼ SW¼ Sec. 32, T10N., R19W., of Ravalli County, approximately seven miles northeast of Stevensville, Montana. All waste from the farrowing unit is contained in an 11,000 gallon holding pond. Waste material from the finishing unit is contained in a pit at the building and a holding pond with a total capacity of approximately 62,000 gallons. Waste material is periodically removed and spread on agricultural land. (Permit #F-17-H issued August 14, 1973).

Applications Pending

Mr. William Covert has made application for a waste discharge permit for an existing animal confinement facility located southeast of Corvallis, Montana. The operation encompasses approximately two acres and produces about 200 pigs per year.

Mr. William E. Billings has made application for a waste discharge permit for an existing total confinement swine operation located approximately seven miles west of St. Regis, Montana. The facility has capacity for approximately 150 swine.

NON-POINT SOURCES

A number of non-point water pollution problems may occur within the Lower Clark Fork River basin. Major sub-basins can be characterized according to the primary type(s) of non-point pollution as follows:

Lower Flathead

Irrigation return flows increasing sediment loads and salt content of streams.

Bitterroot

Irrigation dewatering and irrigation return flows. Also, sedimentation and thermal effects from logging activity.

Mainstream Clark Fork

Logging activity resulting in sedimentation and hydrologic changes in streams.

Some specific problems which have been identified include:

(1) Low flows and heavy sedimentation in the Lower Little Bitterroot River resulting from irrigation diversions, irrigation return flows and erosion of fragile soils;

(2) Serious turbidity and sedimentation from irrigation return flows in several creeks in the Lower Flathead drainage; including Crow Creek and Post Creek;

(3) Dewatering and sedimentation of the Bitterroot River below Hamilton due to irrigation withdrawals and return flows;

(4) The Montana Dept. of Fish & Game reports that road building, dredge mining and logging have caused severe erosion, sedimentation and habitat deterioration in Fish Creek and Ninemile Creek, both tributaries of the main Clark Fork River.

In addition, other problems are occasionally noted relative to cattle confinement near streams (see "Agricultural Discharges"), logging operations in or adjacent to streams, mining operations such as small individual gold sluices in streams, recreational subdivisions along lake and stream waterfronts and pesticide or fertilizer application in some areas. Non-point pollution problems are normally dealt with on a complaint basis. Applicable laws and regulations are noted below.

Cattle Confinement Areas

As discussed under "Agricultural Discharges", any cattle confinement area with a potential for causing water pollution must obtain a permit from the State Dept. of Health & Environmental Sciences. Conditions of the permit would assure proper disposal of wastes with a minimal effect on water quality. As many such small operations

exist, and as the permit program is relatively new, only part of the operations are presently under permit, but all are being contacted when brought to the attention of the state. Control methods may include fencing to keep animals from entering streams, collection facilities for containing wastes, a program for properly disposing of the collected wastes and odor control provisions.

Logging Operations

Water quality effects from logging operations may include temperature increases due to elimination of shade, increased siltation, turbidity resulting from erosion, outright stream modifications from operations conducted in the creek and increased nutrient loads and organic color in the streams due to water leaching through slash and debris. The U.S. Forest Service controls most of the land in the basin managed for timber harvest, and on these lands federal logging standards are established and enforced by the Forest Service. The state has jurisdiction when water quality standards are violated.

The hydrological effects of logging (vegetation removal) are documented and discussed for the Bitterroot drainage in a report published by Bitterroot Water Incorporated (Ref. 35).

Mining Operations

Most mining operations affecting water quality are point discharge systems. Recently gold prices have increased, with a result that many individuals are conducting small gold placer operations on small headwater streams, particularly in the Lower Clark Fork area. Such operations can cause considerable turbidity and sedimentation, and usually are in violation of state water quality standards.

Waterfront Subdivisions

Land subdivisions, accompanied by clearing, development and influx of concentrated populations along shorelines of lakes and streams, can cause water quality problems. Most often, such problems are related to improper sewage disposal which results in bacteriological, organic and nutrient pollution in the adjacent waters. Such problems are most pronounced where the soils are too "tight" or rocky, the ground is too steep, or the sewage disposal system is located in a flood plain or high groundwater area. Under present laws, the State Department of Health and Environmental Sciences must approve all subdivisions with lots of 20 acres and less, prior to filing or sale. Such approval must include a technical review to assure that each lot has enough suitable ground to provide for proper sewage disposal. The actual construction on the lot falls under the jurisdiction of the county sanitarian's office.

Any water pollution problems which are proven to be the result of a failing or inadequate sewage disposal facility must be corrected as ordered by either the Department of Health and Environmental Sciences or the county health department.

Pesticide or Fertilizer Application

Application directly to streams or lakes could be a violation, but few problems of this nature occur in the Lower Clark Fork drainage. Pesticide applicators are now licensed by the State Department of Health and Environmental Sciences and the licensing process includes education on personal safety and environmental effects. The most serious common misuse of pesticides relates to treatment of irrigation ditches to kill nuisance weeds. Such treatments are often dumps of chemicals in unmeasured amounts into flowing ditches, and on occasion this has caused fish kills in natural streams. Problems of this nature have occurred on the Flathead Indian Reservation, and possibly in the Bitterroot drainage.

Power Generation

Hydroelectric dams create reservoirs, greatly altering the aquatic environment of the once free-flowing streams. Fish populations, spawning runs and species composition may all be severely affected by dam installations. In addition, downstream temperature, suspended solids concentrations and gas supersaturation may be adversely affected, depending on how the dam is designed and operated. In nutrient-rich streams, such as the upper part of the Clark Fork River, impoundments can result in severe algal blooms. The only known viable dam proposals in this study area are the Buffalo Rapids 2 and 4 sites on the lower Flathead River. Before these structures are authorized, detailed studies should be made to assess the effects on the fisheries and on water quality.

Likewise, nuclear or fossil fuel generation plants can result in water quality problems if thermal or radioactive wastes are discharged. No such plants are seriously proposed in the drainage at this time, but should this occur, pre-authorization water quality studies would be in order.

VII. SURFACE WATER RESOURCES

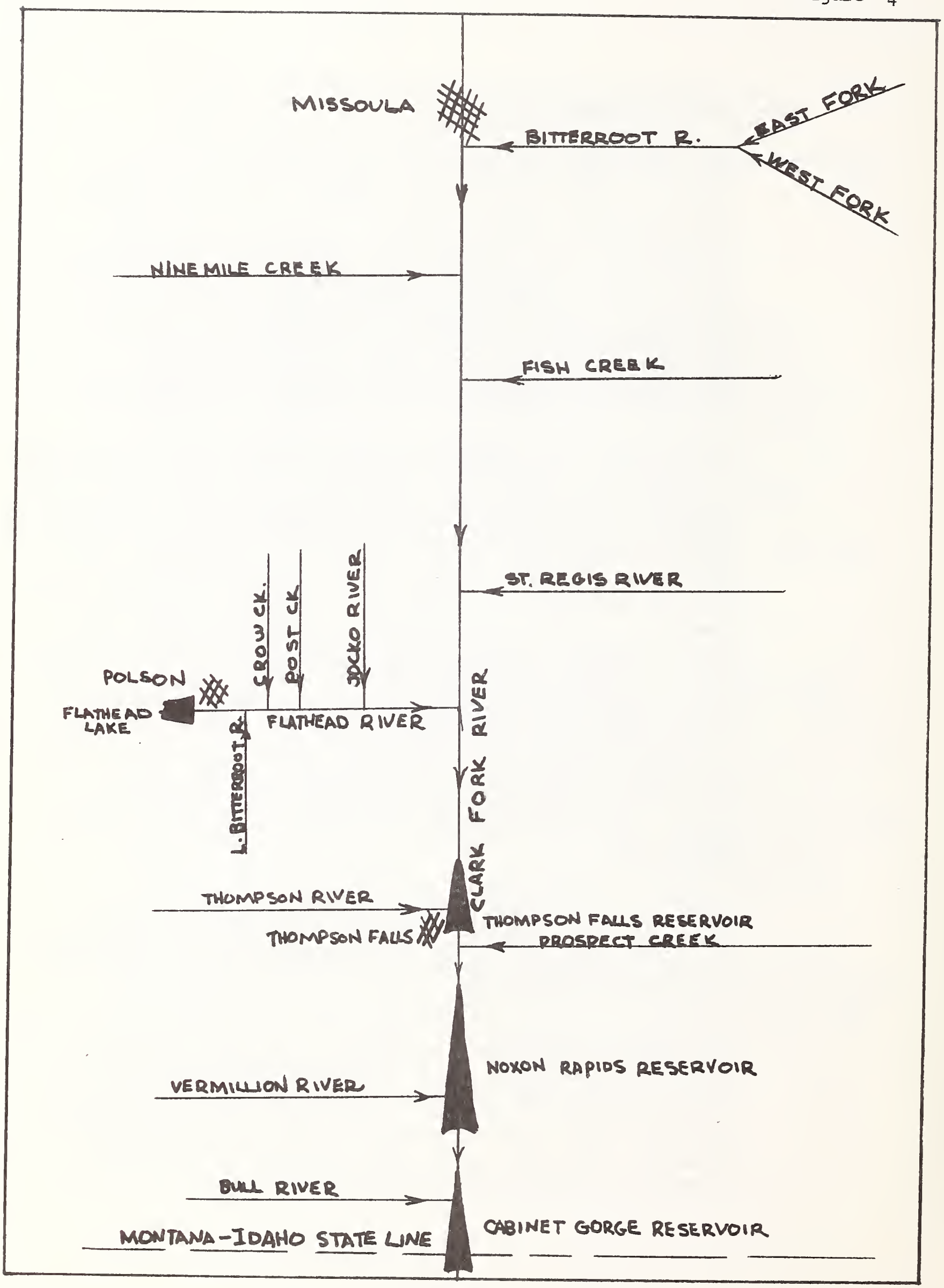
The Lower Clark Fork drainage basin, for purposes of this report is subdivided into four segments. These are the main Clark Fork River from Missoula to the Idaho border, the Bitterroot River drainage, the St. Regis drainage and the Flathead River from Flathead Lake downstream to its confluence with the Clark Fork. Other significant drainages in the basin include the Jocko River, the Thompson River and the Bull River. The Lower Clark Fork drainage basin and its major tributaries are shown schematically in Figure 3. The USGS has had 31 stream flow gaging stations in the Lower Clark Fork drainage basin and fifteen of these remain active (Plate 1). The USGS data for gaging stations in the basin are summarized in Table VIII.

Stream flows in the Lower Clark Fork drainage basin are affected by local weather conditions, geology, reservoir and dam operation and irrigation (Table VIII). The major part of the flow occurs during the spring runoff. However, spring runoff is a function of weather and precipitation and may be quite variable in time and volume of runoff. May, June and early July are commonly the months during which the spring runoff occurs in the Lower Clark Fork basin. However, warm weather in mid-winter occasionally produces significant heavy runoffs as early as January. Peak flows in smaller drainage basins, particularly mountain streams such as the Bitterroot River and the St. Regis River, normally occur in May and early June, tailing out several weeks before similar flows in the main drainage basins. Regulation at reservoirs and power generating sites have, in the past, caused considerable variations in downstream river flows in some areas. For example, minimum recorded flow below Noxon Rapids Dam is 80 cfs, which is abnormal and far below the 21,000 cfs average annual flow. This low flow occurred when the upstream dam was being filled.

Irrigation markedly affects flows in several streams in the drainage basin. Many small streams on the Flathead Indian Reservation, including the Little Bitterroot River, Jocko River, Crow Creek and Post Creek are moderately to severely affected by irrigation withdrawals.

The Bitterroot River north of Hamilton is severely affected by irrigation withdrawals. Irrigation withdrawal problems occur during the summer priod, at which time some portions of streams become nearly dewatered. The hydrological conditions in the Bitterroot drainage have been summarized by Bitterroot Water, Inc. (Ref. 35). This report indicates that minimum streamflows for support of fisheries are not being maintained in several portions of the Bitterroot drainage.

Figure 4



SCHEMATIC DIAGRAM OF STREAMS IN THE LOWER CLARK FORK RIVER DRAINAGE BASIN

Flood irrigation practices are still utilized in portions of the Bitterroot drainage and the Flathead Indian Reservation, so much of the water is eventually returned to the streams. Quality of these returned waters, however, is usually poor, as they carry silt and dissolved salts. In addition to individual irrigation withdrawals from the streams in the study basin, there are a number of irrigation reservoirs on some smaller tributaries. The Little Bitterroot River, tributary to the Flathead River below Kerr Dam, is regulated with storage reservoirs primarily for irrigation use, and the low flows in this stream often reach very low levels. The water also carries very high silt loads. Larger dams in the study area, including Hungry Horse Dam, Kerr Dam, Thompson Falls Dam, Noxon Rapids Dam and Cabinet Gorge Dam are all principally power generation dams, affected very little by irrigation withdrawals. Of these power dams, however, only the latter three can be considered run-of-the-river dams and they carry some storage. Seasonal storage for flood control and power generation affect downstream flow rates, which may not coincide with natural seasonal variations.

Several sizable rivers still exist in the basin with no regulation by means of dams, and little or no irrigation withdrawal. These rivers include the St. Regis, Thompson, Vermillion and the Bull, all tributary to the main Clark Fork River. These rivers, all originating in foothill and mountainous areas, show typical early runoff patterns, with flows greatly diminished by July.

The schematic diagram of streams in the basin (Figure 4), illustrates how the lower portion of the Clark Fork River is essentially completely developed with dam sites, while the upper portion is unregulated on the main stem. At present, new dam sites are being considered on the lower Flathead River. Six separate dam sites have been considered in the lower 60 miles of the Flathead River, above its junction with the Clark Fork. These include the Sloan Bridge, Paradise, Knowles, High Buffalo Rapids 2 and 4 damsites. Of these six proposals, at present only the combination of the Buffalo Rapids 2 and 4 run-of-river dams are being considered as viable proposals. Dam construction and operation in the lower Flathead area is under the jurisdiction of the Confederated Salish-Kootenai tribes. This jurisdiction has been transferred in the past by contract to Montana Power Co. at Kerr Dam, but the lease at this particular site is due to expire soon, and it is not known whether the Tribe will elect to operate this and future dams in the Lower Flathead drainage.

Water quality effects from dams and other power generation facilities are discussed on page 42.

TABLE VIII - SUMMARY OF U.S. GEOLOGICAL SURVEY STREAMFLOW GAGING STATION DATA (Ref. 22)

STATION NAME	USGS STATION NO.	LOCATION(1)	EXTREME RECORD FLOW (cfs) INSTANTANEOUS MINIMUM	MAXIMUM	DRAINAGE AREA (Sq. Mi.)	ANNUAL AVERAGE FLOW (cfs)	PERIOD OF RECORD
Clark Fork above Missoula	12340500	13N18W19BBB	115	31,700	5,999	2,956	1929 - Present
West Fork Bitterroot River near Conner, MT	12342500	1S22W26BAD	0.2	4,060	317	288	1941 - Present
Bitterroot River near Darby, MT	12344000	3N21W36ADC	71	11,500	1,049	918	1937 - Present
Sleeping Child Creek near Hamilton, MT	12345850	4N20W2BCD	11	305	63	---	Occasional, 1958 1959, 1961, 1973
Skalkaho Creek near Hamilton, MT	12346500	5N19W27AC	10	1,210	88	93	1948-1953, 1957-Present
Clark Fork below Missoula	12353000	13N20W21DAB	388	52,800	9,003	5,395	1929 - Present
St. Regis River near St. Regis, MT	12354000	18N28W26AB	41	7,740	303	562	1910-1917 1958-Present
Clark Fork at St. Regis	12354500	18N27W19Ccenter	1,000	68,900	10,709	7,501	1910 - Present
Flathead River near Polson, MT (below Kerr Dam)	12372000	22N21W11DAC	5	82,800	7,096	11,730	1907 - Present
Clark Fork near Plains, MT	12389000	19N26W01CA	3,200	134,000	19,958	19,890	1910 - Present
Thompson River near Thompson Falls, MT	12389500	21N28W07DAB	68	6,080	642	488	1911-1916 1956-Present

TABLE VIII (Contd.)

STATION NAME	USGS STATION NO.	LOCATION(1)	EXTREME RECORD FLOW (cfs) INSTANTANEOUS MINIMUM	MAXIMUM	DRAINAGE AREA (Sq. Mi.)	ANNUAL AVERAGE FLOW (cfs)	PERIOD OF RECORD
Prospect Creek at Thompson Falls, MT	12390700	21N29W07DDD	29	2,860	182	259	1956-Present
Clark Fork below Noxon Rapids Dam, near Noxon, MT	12391400	26N32W33C	80	124,900	21,833	21,470	1960-Present
Bull River near Noxon, MT	12391550	26N33W03ABB	---	2,790	139	---	Sporadic; seven years since 1942
Clark Fork at Whitehorse Rapids, near Cabinet, Id.	12392000	55N03E27BC	270	153,000	22,073	22,180	1928-Present
Marshall Creek near Missoula, MT (2)	12340200	13N18W18B	---	20	5.5	---	1959-73
Burke Gulch near Darby, MT (2)	12344300	03N21W12C	---	3	6.3	---	1958-73
Camas Creek near Hamilton, MT (2)	12345800	05N21W34C	---	78	6.0	---	1958-73
Willow Creek near Corvallis, MT (2)	12348500	06N19W08AC	---	50	22.4	---	1920-24, 1957-65 1966-73
Gash Creek near Victor, MT (2)	12350200	08N21W32B	---	55	3.4	---	1958-73
Kootenai Creek near Stevensville, MT (2)	12350500	09N20W18BC	---	560	28.9	---	1948-53, 1957-63 1964-73
Burnt Fork Bitterroot (2) River near Stevensville, MT	12351000	08N19W11CB	---	185	74	---	Misc. plus 1938-73

TABLE VIII (Contd.)

STATION NAME	USGS STATION NO.	LOCATION (1)	EXTREME RECORD FLOW (cfs) INSTANTANEOUS MINIMUM	MAXIMUM	DRAINAGE AREA (Sq. Mi.)	ANNUAL AVERAGE FLOW (cfs)	PERIOD OF RECORD
Eightmile Creek near Florence, MT (2)	12351400	10N19W02CC	---	8	21	---	1957-73
Hayes Creek near Missoula, MT (2)	12352200	12N20W10ACC	---	2	4.2	---	1959-73
Nigger Gulch near Alberton, MT (2)	12353400	15N23W33B	---	3	8.0	---	1959-73
Thompson Creek near Superior, MT (2)	12353800	17N26W28C	---	4	12.2	---	1961-73
East Fork Timber Creek near Haugan, MT (2)	12353850	19N30W16A	---	8	2.7	---	1961-73
North Fork Little Joe Creek near St. Regis, MT (2)	12354100	18N28W34DC	---	295	14.7	---	1960-73
Teepee Creek near Polson, MT (2)	12370900	24N19W23C	---	5	2.5	---	1960-73
Mill Creek near Niarada, MT (2)	12374300	24N24W21B	---	17	28	---	1959-73
Garden Creek near Hot Springs, MT (2)	12375700	22N24W20C	---	17	3.3	---	1959-73

(1) See Appendix C, System for Location of Geographic Features

(2) Partial-Record Station; Minimum and Average Flows Not Available

TABLE IX

TYPICAL STREAM FLOW DATA FOR LOWER CLARK FORK DRAINAGE BASIN

Monthly Mean Discharge (cfs) for Water Year Oct. 1972 to Sept. 1973

STATION NAME	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	TOTAL FOR YR. (1000 ACRE-FT)	AVG. YR (1000 ACRE-FT)
Clark Fork above Missoula, MT (1)	1,904	1,704	1,470	1,385	1,248	1,516	1,570	3,816	3,652	1,351	805	1,007	1,294	2,142
Bitterroot River near Darby, MT	297	253	260	302	234	260	594	1,486	1,311	443	351	537	382	665
Clark Fork below Missoula, MT (1)	2,975	2,641	2,283	2,231	2,040	2,344	2,784	7,376	7,339	2,226	1,201	1,884	2,254	3,909
St. Regis River near St. Regis, MT	123	117	162	237	159	200	450	886	420	155	83	77	186	407
Flathead River near Polson, MT (1)	8,150	9,589	10,380	10,690	11,990	9,332	6,808	8,412	12,260	10,060	5,997	3,008	5,815	8,498
Clark Fork near Plains, MT (1)	12,560	13,460	14,770	14,780	15,070	12,960	10,990	18,710	22,350	13,960	8,286	5,754	9,869	14,410
Thompson River near Thompson Falls, MT	238	210	187	201	168	180	253	539	406	205	145	129	173	354
Bull River near Noxon, MT	111	101	151	236	137	197	289	784	591	216	97	87	181	Not Avl
Clark Fork at Whitehorse Rapids near Cabinet, ID (1)	13,730	14,280	14,290	16,310	16,590	19,120	15,990	17,750	25,500	15,560	8,689	5,579	11,060	16,080

Note: As the data indicates, this water year represents an unusually dry year. However, the runoff patterns are similar to those of a wetter year. The data presented are the most recent available.

(1) This station affected by upstream dam(s).

VIII. WATER QUALITY

Water quality in the Lower Clark Fork drainage basin is variable, the basin being large and diverse. Generally speaking, streams flowing through concentrated agricultural areas are most degraded, with temperatures, suspended solids concentrations and other parameters indicating the effects and flow reduced by irrigation diversions. Municipal and industrial effects are present, but quite subdued in the basin. Steams flowing through remote areas, including most streams of the study area, have excellent water quality, tempered only by natural seasonal runoff effects.

For the purpose of more detailed discussion, the drainage basin is broken into four segments, including the Bitterroot River drainage, the Clark Fork River drainage from Missoula to Alberton, The Clark Fork River drainage from Alberton to the Idaho border and the Flathead River drainage from Polson to its confluence with the Clark Fork River.

Bitterroot River Drainage

Flows in the middle portions of the Bitterroot River are greatly reduced by irrigation diversions during summer months, resulting in a nearly dewatered stream. Irrigation return flows and runoff from the downstream remainder of the basin produce substantial year around flows in the Bitterroot at its confluence with the Clark Fork River at Missoula. While return flows discharge needed water to the Bitterroot River, they also return sediment and nutrients. It is near this confluence where most of the Bitterroot River water quality data has traditionally been gathered. Part of this data is shown in the attached tables of water quality parameters. The water quality data from the mouth of the Bitterroot River does not indicate any violations of water quality standards, although nitrates and coliform densities indicate some degradation. Data for the stream is not plentiful, however, and it is probable that late summer analyses would show thermal increases, oxygen decreases and perhaps increases in conductivity and coliform bacteria. Municipal and industrial discharges are regulated through the MPDES discharge permit system, and discharges are monitored regularly. From such monitoring data, it appears that water quality problems in the Bitterroot River should not result from municipal or industrial waste sources. Dewatering for agricultural use appears to have more adverse effect on water quality in the Bitterroot River than the combined municipal and industrial discharges.

The many tributaries of the Bitterroot River are generally of excellent water quality. Activities such as road construction and logging may cause temporary problems in any of the tributaries. However, U.S. Forest Service water quality sampling programs (see stations marked on foldout map) have regularly demonstrated excellent water quality in tributary streams.

TABLE X . AVERAGE RESULTS OF ANALYSES, CLARK FORK RIVER, SUMMER, 1973
(Accompanies Figure 4 ; See Ref. 25)

STATION (1)	TEMP.(3) (°C.)	pH (4) (S.U.)	D.O.(4) (mg/l)	Sp. Cond.(3) (µ-mho/cm)	Color(3) (S.U.)	BOD_5 (3) (mg/l)	Tot. Coli.(3) (#/100ml)	Fecal Coli.(3) (#/100ml)
CF - US	21.0 / 20.1	8.2 / 8.4	8.6 / 9.4	339 / 323	5 / 5	1.4 / 1.3	2600 / 370	260 / 87
CF - DS	22.0 / 20.0	8.2 / 8.3	8.4 / 9.3	350 / 331	5 / 5	4.1 / 3.0	30,000 / 3,800	7,300 / 923
CF - 1	18.0 / 17.2	8.0 / 8.1	7.9 / 8.5	318 / 308	5 / 5	1.8 / 1.3	2,200 / 588	690 / 124
CF - 2A (2)	17.5 / 16.4	7.2 / 7.7	6.7 / 7.5	515 / 410	90 / 50	16.2 / 5.1	570 / 334	250 / 194
CF - 3	18.0 / 17.1	7.6 / 7.8	7.6 / 8.2	340 / 316	15 / 7	4.4 / 1.8	2,800 / 516	230 / 50
CF - 4	18.5 / 17.7	7.5 / 7.9	7.9 / 8.3	329 / 319	20 / 10	4.6 / 2.0	2,900 / 595	140 / 38
CF - 5	20.0 / 18.5	7.9 / 8.1	8.1 / 8.8	340 / 322	12 / 8	2.8 / 1.7	1,500 / 270	100 / 23
CF - 6	20.0 / 18.5	7.7 / 8.2	7.5 / 8.2	334 / 322	15 / 10	3.8 / 1.5	260 / 110	60 / 18
CF - 7	19.5 / 18.2	8.1 / 8.3	7.7 / 8.1	334 / 320	10 / 7	3.4 / 1.9	160 / 63	14 / 6
CF - 8	19.5 / 18.3	8.1 / 8.2	7.7 / 8.1	329 / 319	10 / 7	1.7 / 1.4	250 / 126	34 / 16

(1) - See Figure for locations of these stations.

(2) - Side channel, Clark Fork River, containing strong pond waste seepage from Hoerner Waldorf.

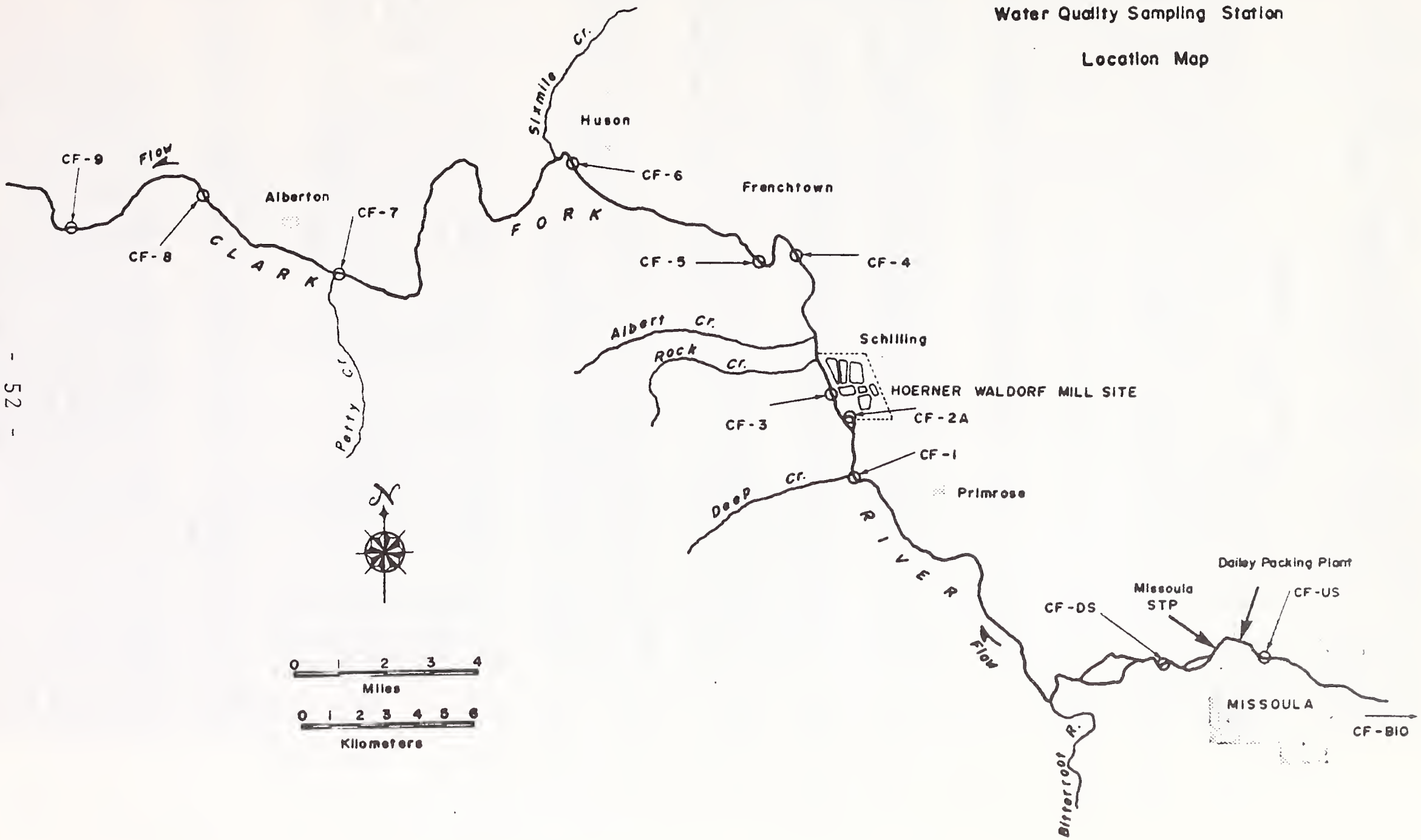
(3) - Average value \ Maximum value. (4) - Average value \ Minimum Value.

Figure 5 (From Ref. 25)

CLARK FORK RIVER

Water Quality Sampling Station

Location Map



Hydrologically, the Bitterroot River tends to have rapid, extreme runoff during the spring months, and floods are not uncommon. During the high runoff periods, water quality is naturally degraded.

Clark Fork River; Missoula to Alberton

Section X of this report, "Waste Load Allocations," discusses water quality problems in the main Clark Fork River in the vicinity of Missoula and the Hoerner-Waldorf pulp mill. Tables X and XI and Figures 5 and 6, document two of the water quality studies which have been made of this portion of the Clark Fork River.

The pertinent data, and Section X of this report, may be summarized as follows:

1. Water quality entering the Lower Clark Fork basin (near Missoula) is only fair, due to residual effects of industrial discharges far upstream.

2. Water quality in the Missoula-Alberton segment of the Clark Fork River is on a continually improving trend, except for minor effects of the Missoula sewage plant and the Hoerner-Waldorf plant.

3. The Missoula sewage plant has been upgraded recently. While water quality effects are minimal, BOD and nutrients are discharged to the Clark Fork.
4. The Hoerner-Waldorf plant affects organic color and possibly phenol levels and nutrients in the Clark Fork River. Treatment of the pulping wastewaters is being upgraded at the present time.

   Phenols were monitored below the pulp mill on occasions between July 1974, and August 1975, by Professor R.E. Erickson of the University of Montana (Ref. 36). In a summary report, it was indicated that phenols in the Clark Fork River at the time of sampling were below detectable limits.

5. It is felt that none of the existing discharges within the Missoula-Alberton segment would reduce water quality below state standards if these same standards were maintained upstream of Missoula. One possible exception to this is the Hoerner-Waldorf pulp mill as discussed above, and it will not be known for certain whether the new treatment facilities when placed in operation will meet state standards. The mill will be required to meet these standards, however, and a time schedule has been established to this end.

Typical water quality data is shown in Table XIII for the Clark Fork River above Missoula, the Clark Fork River near Alberton, and tributary Fish Creek.

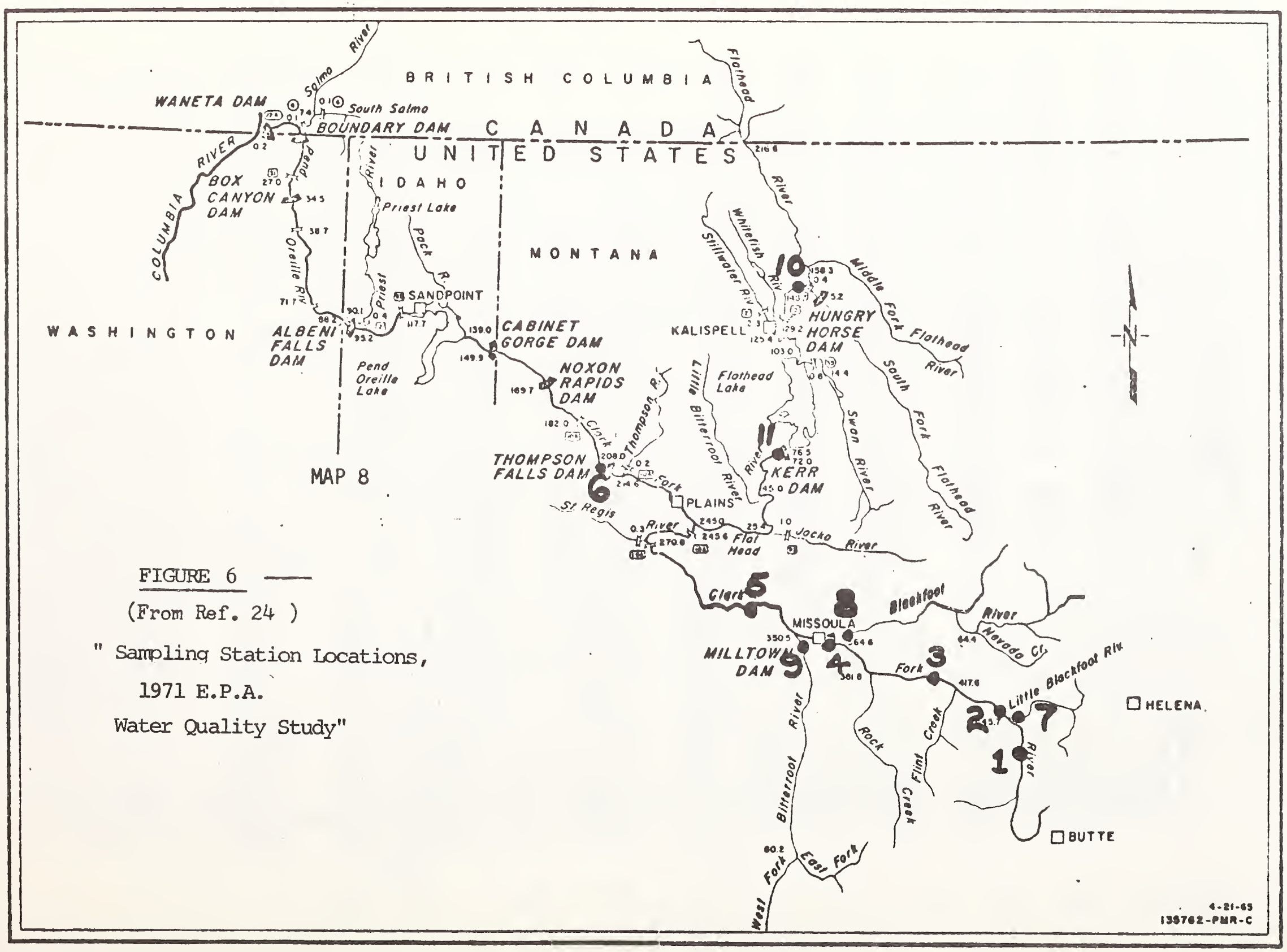
Flathead River; Polson to Confluence with Clark Fork

Water Quality data for three stations on the Flathead River and five stations on its tributaries is shown in Table XIII. The water quality of the main Flathead River is excellent, due in part to its large size and dilution capacity, and in part to upstream Flathead Lake which acts as a huge settling basin. Only during spring peak flow periods is water quality reduced due to natural causes.

Table XI (Ref. 24)

Water Quality Data Summary
(To Accompany Fig. 5)

Map Key	Clark Fork Subbasin	River Mile	D.O. (mg/l)	T (°C)	Coliform MPN/ 100ml	pH	Color PT-CO Units	Hard. (mg/l)	Turb. (JTU)	TDS (mg/l)	Ortho PO_4 (mg/l)	NO_3-N (mg/l)	Fe (mg/l)
#1	Clark Fork River at Deer Lodge	745.5-456											
	Mean		--	11.1	--	7.4	--	354	--	533	--	1.24	0.49
	Min.		--	0.6	--	6.8	--	214	--	312	--	0.00	0.10
	Max.		--	17.8	--	8.4	--	440	--	630	--	3.50	2.20
#2	Clark Fork River below Garrison	745.5-443											
	Mean		--	11.1	--	8.0	--	279	--	412	--	0.54	0.62
	Min.		--	0.0	--	7.6	--	157	--	216	--	0.00	0.10
	Max.		--	17.8	--	8.6	--	390	--	516	--	3.50	2.14
#3	Clark Fork River at Ravenna	745-386											
	Mean		--	10.0	--	8.0	--	286	--	388	--	0.18	0.71
	Min.		--	1.7	--	7.6	--	187	--	236	--	0.00	0.10
	Max.		--	17.3	--	8.3	--	358	--	452	--	0.50	2.50
#4	Clark Fork River at East Missoula	745.5-363											
	Mean		9.7	10.0	--	8.0	--	179	--	229	--	1.06	0.29
	Min.		8.4	1.1	--	7.7	--	105	--	106	--	0.00	0.00
	Max.		12.6	16.1	--	8.6	--	231	--	324	--	11.20	1.16
#5	Clark Fork River at Six Mile	745.5-330											
	Mean		10.2	8.4	--	7.9	--	135	--	172	--	0.20	0.36
	Min.		7.1	0.6	--	7.5	--	71	--	88	--	0.00	0.04
	Max.		12.6	18.9	--	8.4	--	182	--	224	--	0.70	1.36
#6	Clark Fork River at Thompson Falls Res.	745.5-208											
	Mean		--	--	--	--	--	100	--	109	--	0.20	0.15
	Min.		--	--	--	--	--	50	--	70	--	0.00	0.00
	Max.		--	--	--	--	--	132	--	150	--	0.90	0.56
#7	Little Blackfoot River at Garrison	745.5-445.7-2.0											
	Mean		--	--	--	8.0	--	158	--	195	--	0.15	0.33
	Min.		--	--	--	7.6	--	78	--	108	--	0.00	0.00
	Max.		--	--	--	8.3	--	385	--	582	--	0.90	2.10
#8	Blackfoot River near Bonner	745.5-364.6-2.0											
	Mean		9.5	--	--	8.1	--	125	--	132	--	0.10	0.27
	Min.		8.6	1.7	--	7.8	--	83	--	112	--	0.00	0.00
	Max.		11.6	15.0	--	8.4	--	165	--	152	--	0.50	1.06
#9	Bitterroot River near Missoula	745.5-350.5-1.0											
	Mean		9.8	--	--	7.8	--	90	--	71	--	0.07	0.30
	Min.		8.0	3.3	--	7.3	--	31	--	46	--	0.00	0.00
	Max.		11.8	14.5	--	8.2	--	110	--	122	--	0.40	1.06
	Flathead Subbasin												
#10	Flathead River at Columbia Falls	745.5-245.0-143											
	Mean		--	--	--	7.5	--	88	--	101	--	0.27	0.002
	Min.		--	--	--	7.1	--	69	--	89	--	0.00	0.00
	Max.		--	--	--	8.0	--	107	--	123	--	1.40	0.06
#11	Flathead River at Kerr Dam	745.5-245.0-72											
	Mean		--	--	--	--	--	102	--	100	--	0.18	0.20
	Min.		--	--	--	--	--	88	--	86	--	0.00	0.00
	Max.		--	--	--	--	--	126	--	142	--	0.50	1.16
	Pend Oreille Subbasin												
	Pend Oreille River at Newport	745.5-88.3											
	First Quarter												
	Mean		12.5	3.2	101	7.8	3	83	4	99	0.016	0.05	--
	Min.		11.1	0.0	0	7.0	0	77	0	91	0.000	0.02	--
	Max.		15.0	7.8	930	8.1	10	87	10	105	0.050	0.09	--
	Second Quarter												
	Mean		11.5	12.0	119	7.8	4	74	6	89	0.033	0.05	--
	Min.		9.4	5.1	0	7.3	0	64	0	74	0.000	0.00	--
	Max.		13.6	19.8	930	8.1	5	84	15	102	0.360	0.14	--



MAP 8

FIGURE 6 ——

(From Ref. 24)

" Sampling Station Locations,

1971 E.P.A.

Water Quality Study"

The Flathead River tributaries, for the most part, have fair to poor water quality. Several causes of this poor quality include irrigation return flows, agricultural dewatering, livestock access into the streams, very fragile, erodeable soils in some areas and livestock overgrazing and associated erosion.

The Little Bitterroot River, tributary to the Flathead River from the west near Sloan Bridge, carries very heavy sediment loads, and is high in turbidity. The resulting brown plume in the Flathead River may be seen near the Sloan Bridge. These heavy silt loads are not caused by any known point discharges, although some irrigation return flows may exist. The primary problem is one of poor land use (overgrazing and resulting erosion) combined with dewatering for agricultural purposes and natural causes.

Several other tributaries, including Crow Creek, Post Creek Mission Creek and Jocko River suffer from irrigation return flows, cattle access to streams and dewatering for irrigation. Such problems are largely seasonal with the result that water quality of these streams may vary from excellent to poor. In addition, at least in the case of the Jocko River, pesticides have been troublesome on occasions in the past, causing documented fish kills.

The tributary water quality problems within the Flathead drainage basin will be documented and studied in considerable detail by the Flathead Drainage 208 Project, which is conducting a basin-wide water quality study under Section 208 of the Federal Water Quality Act. The 208 study plans to specifically address irrigation return flow and pesticides problems in the Lower Flathead basin. In this study, potential solutions, implementation, possible stream reclassification and waste load allocations will be addressed. Pending the outcome of this study, no effort will be made by the state to reclassify lower Flathead drainage streams.

Clark Fork River, Alberton to Idaho Border

Water quality studies (Ref. 24,25 and 32) indicate that water quality problems in the Clark Fork River, resulting from industrial discharges far upstream, become stabilized by natural assimilation and dilution in the vicinity of Alberton, Montana. Below Alberton the water quality of the Clark Fork is good to excellent until it leaves Montana. One aesthetic problem which has been documented is frothing of the water below Noxon Rapids Dam during runoff periods probably resulting from spring time discharges from the Hoerner-Waldorf pulp mill near Missoula. The new Hoerner-Waldorf treatment facilities should greatly decrease this aesthetic problem.

The Clark Fork River loses its free-flowing character above Thompson Falls, where it begins its traverse of three artifical reservoirs before entering Idaho.

Tributaries to the Clark Fork River below Alberton (except Flathead drainage, discussed above) are uniformly of excellent water quality. These tributaries, in most instances, originate and flow through remote, undeveloped areas. All of these tributaries are affected seasonally by high spring time runoff and associated turbidity.

Occasional localized problems may be related to cattle access to streams or faulty septic tanks.

One continuous and one occasional municipal discharge of treated sewage exists in the Alberton-to-Idaho segment of the Clark Fork. No measurable water quality problems in the Clark Fork River have been attributed to these discharges.

Typical water quality data for three stations on the Clark Fork River and three tributaries, in the Alberton to Idaho segment are shown in Table XIII.

TABLE XII-LOWER CLARK FORK WATER QUALITY STATIONS

STATION NAME (AGENCY AND NO.)	LOCATION (1)	PERIOD OF RECORD	SAMPLING INTERVAL	WATER QUALITY PARAMETERS
Clark Fork above Missoula, MT (USGS 12340500)	13N19W22DCA	1969-1971	Monthly	Color, NO_3, NO_2, NH_3, Org. N, Diss. P, Ortho P, Total P, TOC, BOD, Pb, Mg, Mn, Hg, Mo, Ni, Se, Ag, Sr, V, Zn, Temp., Sp. Cond., D.O., pH, Alk., Tot. Coliform, Fecal Coliform, Ca, K, SO_4, Cl, F, Diss.Solids, Hardness, Turbidity, Al, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Sr, Zn
Bitterroot River at Maclay Bridge, near Missoula, MT (USGS 12352980)	13N20W26CBD	1970-1973	Monthly	Ca, Mg, Na, SO_4, Cl, F, TDS, Hardness, Na, Diss.NO_2+NO_3, Tot.NO_2+NO_3, Tot.N., Kjeldahl N, Diss.Ortho P, Tot.Ortho P, Tot.P., BOD, T, Sp.Cond., D.O. pH, Alk, Tot.Coliform, Fecal Coliform,
Clark Fork near Alberton, MT (USGS 12353300)	14N23W01DC	1969-1971	Monthly	Ca, SO_4, Cl, F, TDS, Hardness, Turbidity, B, Cu, Fe, Pb, Mg, Mn, Hg, Sr, Zn, Color, NO_3, NO_2, NH_3, Org.N, Diss. P, Diss.Ortho P, Tot.P, TOC, BOD, Temp, Sp.Cond, D.O., pH, Alk., Tot.Coliform, Fecal Coliform
Flathead Lake at Polson, MT (USGS 12371500)	19N20W04 Center	1969-1971	Monthly	Ca, K, SO_4, Cl, F, TDS, Hardness, Turbidity, Al, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Sr, Zn, NO_3, NO_2, NH_3, Org.N, Diss.P., TOC, BOD, Mg, Mo, Ni, Se, Ag, Sr, V, Sp.Cond. D.O., pH, Alk, Tot.Coliform, Fecal Coliform
Flathead River at Perma, MT (USGS 12388700)	19N23W31BCB	1971-1973	Monthly	Ca, Mg, Na, SO_4, Cl, F, TDS, Hardness, SAR, Diss.NO_2+NO_3, Tot.NO_2+NO_3, Tot.N, Kjeldahl N, Diss.Ortho P, Total Ortho P., Tot.P., BOD, Temp., Sp. Cond., D.O., pH, Alk., Tot.Coliform, Fecal Coliform
Clark Fork near Plains, MT (USGS 12389000)	19N26W01CA	1969-1970 1968-1973	Monthly Daily	Fe, Na, K, Cl, F, NO_3, B, TDS, Al, As, Ba, Be, Cd, Cr, Co, Cu, Sp.Cond., D.O., pH, Alk., Total Coliform, Fecal Coliform, Hardness, NO_2, NH_3, Org.N., Diss.P., Tot.P., TOC, BOD, Turbidity, Color, Pb, Mn, Mo, Ni, Se, Ag, Sr, V, Zn - Monthly Daily - Temperature, minimum and maximum
Clark Fork at Thompson Falls, MT (USGS 12391000)	21N30W01DA	1969-1973	Monthly	Ca, Mg, Na, SO_4, Cl, F, TDS, Hardness, SAR, Diss.NO_2+NO_3, Tot.NO_2+NO_3, Tot.N., Kjeldahl N. Diss.Ortho P., Tot.Ortho P., Tot.P., BOD, Temp., Sp.Cond., D.O., pH, Alkalinity, Total Coliform, Fecal Coliform

TABLE XII(Contd.) - LOWER CLARK FORK WATER QUALITY STATIONS

STATION NAME (AGENCY AND NO.)	LOCATION(1)	PERIOD OF RECORD	SAMPLING INTERVAL	WATER QUALITY PARAMETERS
Bitterroot River at Maclay Bridge. Water Quality Bureau MSDHES	13N20W26CBD	12/74	1 sample	Ca, Mg, Na, HCO_3, CO_3, ON, Cl, SO_4, NO_3, PO_4, pH, SC, Dissolved Solids (Calculated), Harness, Alkalinity, Zn, CD, Fe, Cu, Mn
Bull River near mouth-Water Quality Bureau MSDHES	26N33W3BDB	3/74-8/74	2 samples	Ca, Mg, Na, NCO_3, CO_3, DH, Cl, SO_4, NO_3, pH, SC, Temperature, Dissolved Solids (Calculated), Ortho PO_4, Fe, Cu, Mn, Turbidity, TOC, NH_3, Cd, Pb, Zn, As, SAR, Flow, Hardness, Alkalinity
Crow Creek near mouth-Water Quality Bureau, MSDHES	20N21W28BAA	3/74-11/74	3 samples	Ca, Mg, Na, HCO_3, CO_3, OH, Cl, SO_4, NO_3, PO_4, pH, SC, Temperature, Dissolved Solids (Calculated), SAR, Hardness, Alkalinity, Cu, Pb, As, Fe, Zn, Cd, Mn, DO, TSS, Turbidity Fecal Coliform, Total Coliform, Flow
Fish Creek near mouth-Water Quality Bureau, MSDHES	14N25W1AAA	3/74-11/74	2 samples	Ca, Mg, Na, HCO_3, CO_3, OH, Cl, SO_4, NO_3, PO_4, pH, Sc, Temperature, Dissolved Solids (Calculated), Hardness, Alkalinity, SAR, NH_3, Cd, Pb, Zn, As, Fe, Cu, Mn, Turbidity, Total Coliform, Fecal Coliform, DO, TSS
Flathead River near Sloan-Water Quality Bureau, MSDHES	20N21W18ACC	3/74-11/74	3 samples	Ca, Mg, Na, HCO_3, CO_3, OH, Cl, SO_4, NO_3, PO_4, pH, SC, Dissolved Solids (calculated), Temperature, SAR, Hardness, Alkalinity, Fe, Zn, Cd, Mn, TOC, Cu, Pb, As, DO, TSS Total Coliform, Fecal Coliform, Turbidity, Flow
Jocko River near Arlee-Water Quality Bureau, MSDHES	16N20W2BCA	3/74-11/74	4 samples	Ca, Mg, Na, HCO_3, CO_3, OH, Cl, SO_4, NO_3, PO_4, Ph, SC, Dissolved Solids (Calculated), Temperature, SAR, Hardness, Alkalinity, Fe, Zn, Cd, Mn, TOC, Cu, Pb, As, DO, TSS, Total Coliform, Fecal Coliform, Turbidity, Flow
Jocko River near Dixon-Water Quality Bureau, MSDHES	18N21W20ABB	3/74-11/74	2 samples	Ca, Mg, NO_3, pH, SC, Temperature, PO_4, Turbidity, TSS, DO, Total Coliform, Fecal Coliform, Flow, Fe, Zn, Cd, Mn, Cu, Pb, As

TABLE XII (Contd.) - LOWER CLARK FORK WATER QUALITY STATIONS

STATION NAME (AGENCY AND NO.)	LOCATION (1)	PERIOD OF RECORD	SAMPLING INTERVAL	WATER QUALITY PARAMETERS
Little Bitterroot River near mouth Water Quality Bureau MSDHES	20N21W18CBB	3/74-11/74	3 samples	Ca, Mg, NO_3, pH, SC, Temperature, Turbidity, PO_4, TSS, DO, Total Coliform, Fecal Coliform, TOC, Fe, Zn, Mn, Cd, Cu, Pb, As, Flow
Pilgrim Creek near mouth-Water Quality Bureau, MSDHES	26N33W3BDB	3/74	2 samples	Ca, Mg, Na, HCO_3, CO_3, OH, Cl, SO_4, NO_3, PO_4, pH, SC, Temperature, SAR, Hardness, Alkalinity, NH_3, TOC, Cd, Pb, Zn, As, Fe, Cu, Mn, Turbidity, Flow, TSS, DO
Post Creek up and downstream from Fish Hatchery-Water Quality Bureau, MSDHES	19N20W23DBB Downstream 19N20W23DBA Upstream	3/74-11/74 3/74-11/74	3 samples 3 samples	Ca, Mg, Na, K, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, SC, SAR, Dissolved Solids (calculated) Alkalinity, Hardness, Fe, Zn, Cd, As, Cu, Pb, Mn, TOC, DO, TSS, Fecal Coliform, Total Coliform, Turbidity, Flow Same as above
Prospect Creek near mouth-Water Quality Bureau, MSDHES	21N29W18BDD	3/74-7/74	2 samples	Ca, Mg, Na, HCO_3, CO_3, OH, Cl, SO_4, NO_3, PO_4, pH, SC, Temperature, Turbidity, Dissolved Solids (calculated), SAR, NH_3, Cd, Pb, Zn, As, Fe, Cu, Mn, DO, TSS, Total Coliform, Fecal Coliform, Flow
St. Regis River near mouth-Water Quality Bureau, MSDHES	18N28W25AAC	3/74-11/74	2 samples	Ca, Mg, Na, HCO_3, CO_3, OH, Cl, SO_4, NO_3, PO_4, pH, SC, Temperature, Turbidity, Dissolved Solids (calculated), SAR, NH_3, Cd, Pb, Zn, As, Fe, Cu, Mn, DO, TSS, Total Coliform, Fecal Coliform, Flow
Spring Creek near Ronan-Water Quality Bureau, MSDHES	20N20W2DCC	3/74-11/74	3 samples	Ca, Mg, Na, HCO_3, CO_3, OH, Cl, SO_4, NO_3, PO_4, pH, SC, Temperature, Turbidity, Dissolved Solids (calculated), SAR, NH_3, Cd, Pb, Zn, AS, Fe, Cu, Mn, DO, TSS, Total Coliform, Fecal Coliform, Flow
Thompson River near mouth-Water Quality Bureau, MSDHES	21N28W18BDD	3/74-7/74	2 samples	Ca, Mg, Na, HCO_3, CO_3, OH, Cl, SO_4, NO_3, PO_4, pH, SC, Temperature, Turbidity, Dissolved Solids (calculated), SAR, NH_3, Cd, Pb, Zn, As, Fe, Cu, Mn, DO, TSS, Total Coliform, Fecal Coliform, Flow, TOC

TABLE XII (Contd.) - LOWER CLARK FORK WATER QUALITY STATIONS

STATION NAME (AGENCY AND NO.)	LOCATION (1)	PERIOD OF RECORD	SAMPLING INTERVAL	WATER QUALITY PARAMETERS
Vermilion River near mouth-Water Quality Bureau, MSDHES	24N31W14DBA	3/74-7/74	2 samples	Ca, Mg, Na, HCO_3, CO_3, OH, Cl, SO_4, NO_3, PO_4, pH, SC, Temperature, Turbidity, Dissolved Solids (calculated), SAR, NH_3, Cd, Pb, Zn, As, Fe, Cu, Mn, DO, TSS, Total Coliform, Fecal Coliform, Flow, TOC
Blodgett Creek Bitterroot Valley, MT. U.S.F.S.	6N21W17DD 6N21W17DC	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K,Fe, Mn, SiO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, Temperature, Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, TotalPO_4, Flow
Willow Creek Bitterroot Valley, MT. U.S.F.S.	6N19W11CA 6N19W11BBD 6N19W11BDD	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SiO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, Temperature, Dissolved Solids (calaculated), SC, SAR, Hardness, Alkalinity, Total PO_4 Flow
Burnt Fork of Bitterroot River, MT. U.S.F.S.	7N18W6CA 7N18W6DDD	4/74-6/74	Variable Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SiO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, Temperature, Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, Total PO_4, Flow
Gold Creek Bitter-root Valley, MT U.S.F.S.	7N19W1AA 7N19W1ADA	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SiO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, Temperature, Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, Total PO_4, Flow
Kootenai Creek Bitterroot Valley, MT. U.S.F.S.	9N20W18DD 9N20W18DBA	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SIO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, Temperature, Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, Total PO_4, Flow
Eight Mile Creek Bitterroot Valley, MT. U.S.F.S.	10N18W4CC 10N18W4DCA	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SiO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, Temperature, Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, Total PO_4, Flow

TABLE XII (Contd.) - LOWER CLARK FORK WATER QUALITY STATIONS

STATION NAME (AGENCY AND NO.)	LOCATION (1)	PERIOD OF RECORD	SAMPLING INTERVAL	WATER QUALITY PARAMETERS
Ambrose Creek Bitterroot Valley, MT. U.S.F.S.	9N18W18BB 9N18W18BBB	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SiO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, temperature Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, Total PO_4, Flow
East Fork Bitterroot River, Bitterroot Valley, MT. U.S.F.S	2N20W34 2N17W6	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SiO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, Temperature, Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, Total PO_4, Flow
Moose Creek Bitterroot Valley, MT. U.S.F.S.	3N17W33	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SiO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, Temperature, Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, Total PO_4, Flow
Warm Springs Creek Bitterroot Valley, MT. U.S.F.S.	1N20W14	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SiO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, Temperature, Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, Total PO_4, Flow
East Camp Creek Bitterroot Valley, MT. U.S.F.S.	1S19W16	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SiO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, Temperature, Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, Total PO_4, Flow
West Camp Creek Bitterroot Valley, MT. U.S.F.S.	1S19W16	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SiO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, Temperature, Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, Total PO_4, Flow
Martin Creek Bitterroot Valley, MT. U.S.F.S.	2N19W9	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SiO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, Temperature, Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, Total PO_4, Flow

TABLE XII (Contd.) - LOWER CLARK FORK WATER QUALITY STATIONS

STATION NAME (AGENCY AND NO.)	LOCATION (1)	PERIOD OF RECORD	SAMPLING INTERVAL	WATER QUALITY PARAMETERS
Tolin Creek Bitterroot Valley, MT. U.S.F.S.	1N19W12	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SiO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, Temperature Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, Total PO_4, Flow
Meadow Creek Bitterroot Valley, MT. U.S.F.S.	2N18W24	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
Little Sleeping Child Creek Bitterroot Valley, MT. U.S.F.S.	4N20W16BCA 4N20W9CCC	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
Rye Creek Bitterroot Valley, MT. U.S.F.S.	3N19W31DCA	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
Lost Horse Creek Bitterroot Valley, MT. U.S.F.S.	4N21W12CBD	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
North Fork Rye Creek Bitterroot Valley, MT. U.S.F.S.	3N20W24BDD	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
Chaffin Creek Bitterroot Valley, MT. U.S.F.S.	2N21W03DBD	4/74-6/74	Variable, Max. Bi-Monthly	Same as above

TABLE XII (Contd.) - LOWER CLARK FORK WATER QUALITY STATIONS

STATION NAME (AGENCY AND NO.)	LOCATION (1)	PERIOD OF RECORD	SAMPLING INTERVAL	WATER QUALITY PARAMETERS
Woods Creek Bitterroot Valley, MT. U.S.F.S.	3S22W21BDA	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SiO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, Temperature, Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, Total PO_4, Flow
Deer Creek Bitterroot Valley, MT. U.S.F.S.	3S22W9ADA	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
Hughes Creek Bitterroot Valley, MT. U.S.F.S.	2S22W34ACB	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
Upper Overwhich River Bitterroot Valley, MT U.S.F.S.	2S22W14ACD	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
Lower Overwhich River Bitterroot Valley, MT U.S.F.S.	2S22W10CCC	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
Blue Joint Creek Bitterroot Valley, MT. U.S.F.S.	2S23W1BAB 2S22W4ABA	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
Slate Creek Bitterroot River, MT. U.S.F.S.	2S22W2BAB	4/74-6/74	Variable, Max. Bi-Monthly	Same as above

TABLE XII (Contd.) - LOWER CLARK FORK WATER QUALITY STATIONS

STATION NAME (AGENCY AND NO.)	LOCATION (1)	PERIOD OF RECORD	SAMPLING INTERVAL	WATER QUALITY PARAMETERS
Lodgepole Creek Bitterroot Valley, MT. U.S.F.S.	1N18W	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SiO_2, HCO_3, CO_3, OH, Cl, SO_4, NO_3, pH, Temperature, Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, Total PO_4, Flow
Bertie Lord Creek Bitterroot Valley, MT. U.S.F.S.	2N18W24	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
Sleeping Child Creek Bitterroot Valley, MT. U.S.F.S.	5N20W25ADC 4N21W25AAD 4N19W7DAC 4N20W7BBB	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
Skalkaho Creek Bitterroot Valley, MT. U.S.F.S.	5N19W27ACC	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
Daly Creek Bitterroot Valley, MT. U.S.F.S.	5N19W24DDC	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
South Fork Skalkaho Creek Bitterroot Valley, MT. U.S.F.S.	5N19W25AAA	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
West Fork River Bitterroot Valley, MT. U.S.F.S.	2S22W10CAC 1S22W26ABD 1S22W26BAD 3S22W21ACB 2N21W21CAA	4/74-6/74	Variable, Max. Bi-Monthly	Same as above

TABLE XII (Contd.) - LOWER CLARK FORK WATER QUALITY STATIONS

STATION NAME (AGENCY AND NO.)	LOCATION (1)	PERIOD OF RECORD	SAMPLING INTERVAL	WATER QUALITY PARAMETERS
Upper Nez Perce Creek Bitterroot Valley, MT U.S.F.S.	1S23W13CBA	4/74-6/74	Variable, Max. Bi-Monthly	Ca, Mg, Na, K, Fe, Mn, SiO_2, HCO_3, OH, Cl, SO_4, NO_3, pH, Temperature, Dissolved Solids (calculated), SC, SAR, Hardness, Alkalinity, Total PO_4, Flow
Nez Perce Creek Bitterroot Valley, MT U.S.F.S.	1N22W25DCA	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
Boulder Creek Bitterroot Valley, MT U.S.F.S.	1N22W18CAC	4/74-6/74	Variable, Max. Bi-Monthly	Same as above
Piquett Creek Bitterroot Valley, MT U.S.F.S.	1N21W26ACD 1N21W3CBA	4/74-6/74	Variable, Max. Bi-Monthly	Same as above

TABLE XIII

LOWER CLARK FORK DRAINAGE BASIN WATER QUALITY SUMMARY

Flow-cubic feet per second
Temperature-°C
Turbidity-Jackson Turbidity Units
Specific Conductance-umho/cm at 25° C
pH-S.U.
Calcium-Ca
Magnesium-Mg
Sodium-Na
Potassium-K

Bicarbonate-HCO_3
Carbonate-CO_3
Sulfate-SO_4
Chloride-Cl
Fluoride-F
Nitrate-NO_3
Ortho Phosphate-PO_4
BOD_5-mg/l
Total Coliforms-100/ml

Fecal Coliforms-100/ml
(2) TR Cadmium-Cd
TR Zinc-Zn
TR Arsenic-As
TR Iron-Fe
TR Copper-Cu
TR Lead-Pb
Dissolved Oxygen-mg/l
Total Suspended Solids-mg/l

SAMPLING STATION DESIGNATION	SAMPLING LOCATION	DATE SAMPLED						
Clark Fork above Missoula U.S. Geological Survey Station #12340500	13N19W22DCA	1/8/71	Flow	1000cfs	HCO_3		F. Coliform	48
			Temp.	0.5	CO_3		Cd	0
			Turbidity	1	SO_4	130	Zn	.040
			S. Conductance	535	Cl	7.8	As	0
			pH	7.5	F	0.5	Fe	.100
			Ca	83	NO_3	0.09	Cu	.002
			Mg	16	PO_4	.00	Pb	---
			Na		BOD_5	1.1	DO	12.1
			K	2.4	T. Coliform	370	TSS	
		7/12/70	Flow	3810	HCO_3		F. Coliform	170
			Temp.	17.0	CO_3		Cd	0
			Turbidity	6	SO_4	57	Zn	0.014
			S. Conductance	320	Cl	0.0	As	0.003
			pH	8.3	F	0.3	Fe	0.038
			Ca		NO_3	0.04	Cu	0.022
			Mg		PO_4	0.12	Pb	0
			Na		BOD_5	0.9	DO	8.6
			K	2.2	T.Coliform	3800	TSS	

(1) Concentrations are in milligrams per liter unless otherwise indicated.
(2) TR-Total Recoverable (5 ml concentrated nitric acid added to 1,000 ml of unfiltered sample).

TABLE XIII (Cont.)

SAMPLING STATION DESIGNATION	SAMPLING LOCATION	DATE SAMPLED						
Clark Fork above Missoula U.S. Geological Survey Station #12340500	13N19W22DCA	6/10/70	Flow	15300	HCO_3		F. Coliform	60
			Temp.	10.5	CO_3		Cd	0
			Turbidity	55	SO_4	--	Zn	.022
			S. Conductance	180	Cl	1.6	As	0.004
			pH	8.0	F	0.2	Fe	0.05
			Ca	--	NO_3	0.4	Cu	.008
			Mg	--	PO_4	--	Pb	0
			Na	--	BOD_5	1.6	DO	10.2
			K	1.5	T. Coliform	300	TSS	
Bitterroot River at Maclay Bridge near Missoula Water Quality Bureau	13N20W26CBD	12/31/74	Flow	--	HCO_3	102	F. Coliform	--
			Temp.	--	CO_3	0.0	Cd	< .001
			Turbidity	--	SO_4	6.5	Zn	< .01
			S. Conductance	144	Cl	1.5	As	
			pH	7.2	F	--	Fe	0.05
			Ca	23	NO_3	2.26	Cu	< .01
			Mg	6.0	PO_4	0.06	Pb	--
			Na	4.0	BOD_5	--	DO	--
			K	--	T. Coliform	--	TSS	--
Bitterroot River at Maclay Bridge near Missoula U.S. Geological Survey Station #12352980	13N20W26CBD	1/6/72	Flow	400	HCO_3	104	F. Coliform	0
			Temp.	0.0	CO_3		Cd	0.0
			Turbidity	1	SO_4	--	Zn	0.020
			S. Conductance	190	Cl	--	As	0.002
			pH	7.0	F	0.2	Fe	0.02
			Ca	22	NO_3	0.75	Cu	0.001
			Mg	5.3	PO_4	0.03	Pb	0.001
			Na	--	BOD_5	1.9	DO	12.0
			K	1.9	T. Coliform	13	TSS	
		6/13/72	Flow	21500	HCO_3	30	F. Coliform	130
			Temp	11.0	CO_3		Cd	
			Turbidity	13	SO_4		Zn	0.008
			S. Conductance	60	Cl		As	
			pH	6.4	F	0.2	Fe	0.080
			Ca		NO_3		Cu	
			Mg		PO_4		Pb	
			Na		BOD_5	1.2	DO	9.4
			K		T. Coliform	490	TSS	

TABLE XIII (Cont.)

SAMPLING STATION DESIGNATION	SAMPLING LOCATION	DATE SAMPLED						
Fish Creek near mouth Water Quality Bureau	14N25W1AAA	3/27/74	Flow		HCO_3	94	F. Coliform	
			Temp.	7.5	CO_3	0.0	Cd	< .001
			Turbidity	<1	SO_4	2.7	Zn	< .01
			S. Conductance	152	Cl	0.2	As	< .01
			pH	8.3	F		Fe	0.04
			Ca	20	NO_3	0.04	Cu	< .01
			Mg	7.8	PO_4	0.04	Pb	< .01
			Na	1.6	BOD_5		DO	
			K		T. Coliform		TSS	
		11/4/74	Flow		HCO_3		F. Coliform	0
			Temp.	5.8	CO_3		Cd	
			Turbidity	<1	SO_4		Zn	
			S. Conductance	175	Cl		As	
			pH	8.1	F		Fe	
			Ca	35	NO_3	0.0	Cu	
			Mg	2.0	PO_4		Pb	
			Na		BOD_5		DO	11.3
			K		T. Coliform	0	TSS	0.0
Clark Fork near Alberton, U.S. Geological Survey Station #12353300	14N23W1DC	1/7/71	Flow	1510	HCO_3	148	F. Coliform	7
			Temp.	1.5	CO_3		Cd	--
			Turbidity	--	SO_4	59	Zn	0.02
			S. Conductance	340	Cl	5.5	As	--
			pH	7.8	F	0.3	Fe	0.16
			Ca	55	NO_3	--	Cu	0.002
			Mg	11	PO_4	0.03	Pb	0
			Na		BOD_5	0.8	DO	11.6
			K		T. Coliform	10	TSS	
		4/7/71	Flow	4790	HCO_3	98	F. Coliform	15
			Temp	8.5	CO_3	--	Cd	--
			Turbidity	20	SO_4	79	Zn	0.030
			S. Conductance	325	Cl	1.8	As	
			pH	7.9	F		Fe	
			Ca	47	NO_3	0.4	Cu	0.010
			Mg	8.9	PO_4	0.12	Pb	0.002
			Na		BOD_5	1.2	DO	10.6
			K		T. Coliform	27	TSS	

TABLE XIII (Cont.)

SAMPLING STATION DESIGNATION	SAMPLING LOCATION	DATE SAMPLED						
Clark Fork near Alberton, U.S. Geological Survey Station #12353300	14N23W1DC	7/11/70	Flow	7900	HCO_3	96	F. Coliform	56
			Temp.	17.5	CO_3		Cd	
			Turbidity	5.0	SO_4	32	Zn	0.013
			S. Conductance	225	Cl	1.4	As	
			pH	8.0	F	0.3	Fe	0.036
			Ca		NO_3	0.2	Cu	0.0
			Mg		PO_4	0.02	Pb	
			Na		BOD_5	1.0	DO	8.2
			K		T. Coliform	270	TSS	
		6/9/70	Flow	36100	HCO_3	56	F. Coliform	230
			Temp.	12.5	CO_3		Cd	--
			Turbidity	45	SO_4		Zn	0.019
			S. Conductance	140	Cl	1.4	As	0.001
			pH	8.0	F	0.2	Fe	0.013
			Ca		NO_3	0.3	Cu	0.025
			Mg		PO_4		Pb	--
			Na		BOD_5	1.4	DO	9.6
			K	1.3	T. Coliform	520	TSS	
Flathead Lake at Polson, MT U.S. Geological Survey Station #12371550	22N20W4	11/10/75	Flow	4330	HCO_3	109	F. Coliform	0
			Temp.	7.0	CO_3		Cd	0.0
			Turbidity	1.0	SO_4		Zn	0.015
			S. Conductance	180	Cl	0.2	As	0.0
			pH	7.9	F		Fe	0.004
			Ca		NO_3	0.0	Cu	0.0
			Mg		PO_4	--	Pb	0.0
			Na	1.1	BOD_5	0.4	DO	10.5
			K	0.8	T. Coliform	0	TSS	
		11/18/71	Flow	5860	HCO_3	113	F. Coliform	0
			Temp	5.5	CO_3		Cd	
			Turbidity		SO_4		Zn	
			S. Conductance	185	Cl		As	
			pH	7.6	F		Fe	
			Ca		NO_3	0.0	Cu	
			Mg		PO_4	0.11	Pb	
			Na		BOD_5	0.8	DO	11.1
			K		T. Coliform	4	TSS	

TABLE XIII (Cont.)

SAMPLING STATION DESIGNATION	SAMPLING LOCATION	DATE SAMPLED							
Flathead Lake at Polson, MT U.S. Geological Survey Station #12371550	22N20W4	6/8/70	Flow	41300	HCO_3	--	F. Coliform	0
			Temp.	14.0	CO_3	--	Cd	0.0
			Turbidity	3.0	SO_4	00	Zn	0.0
			S. Conductance	170	Cl	1.1	As	0.001
			pH	8.3	F	0.1	Fe	0.0
			Ca		NO_3	0.04	Cu	0.0
			Mg		PO_4	--	Pb	0.0
			Na		BOD_5	0.9	DO	9.4
			K	0.7	T. Coliform	24	TSS	
		6/7/71	Flow	42000	HCO_3	94	F. Coliform	0
			Temp.	10.5	CO_3		Cd	
			Turbidity		SO_4		Zn	
			S. Conductance	180	Cl		As	
			pH	7.7	F		Fe	
			Ca		NO_3	0.0	Cu	
			Mg		PO_4	0.3	Pb	
			Na		BOD_5	0.6	DO	11.2
			K		T. Coliform	12	TSS	
Little Bitterroot River near mouth, Water Quality Bureau	20N21W18CBB	3/28/74	Flow		HCO_3		F. Coliform	
			Temp.	9.5	CO_3		Cd	<.001 (
			Turbidity		SO_4		Zn	0.03 (
			S. Conductance		Cl		As	0.003
			pH		F		Fe	5.3 (2
			Ca		NO_3	0.09	Cu	<.01 (2
			Mg		PO_4		Pb	<.01 (2
			Na		BOD_5		DO	
			K		T. Coliform		TSS	
		6/27/74	Flow	43	HCO_3		F. Coliform	16
			Temp	22.8	CO_3		Cd	
			Turbidity	125	SO_4		Zn	
			S. Conductance	305	Cl		As	
			pH	8.2	F		Fe	
			Ca		NO_3	0.66	Cu	
			Mg		PO_4		Pb	
			Na		BOD_5		DO	8.2
			K		T. Coliform	260	TSS	174

TABLE XIII (Cont.)

SAMPLING STATION DESIGNATION	SAMPLING LOCATION	DATE SAMPLED						
Little Bitterroot River near mouth, Water Quality Bureau	20N21W18CBB	11/4/74	Flow	19	HCO_3		F. Coliform	10
			Temp.	5.0	CO_3		Cd	
			Turbidity	75	SO_4		Zn	
			S. Conductance	340	Cl		As	
			pH	8.5	F		Fe	
			Ca	33	NO_3	0.06	Cu	
			Mg	4	PO_4		Pb	
			Na		BOD_5		DO	11.4
			K		T. Coliform	18	TSS	72.0
Flathead River near Sloan Water Quality Bureau	20N21W18ACC	3/28/74	Flow		HCO_3	110	F. Coliform	
			Temp.	6.0	CO_3	0.0	Cd	<.001
			Turbidity		SO_4	16.0	Zn	0.01
			S. Conductance	216	Cl	3.3	As	<.001
			pH	8.0	F		Fe	1.6
			Ca	23	NO_3	0.0	Cu	<.01
			Mg	7.0	PO_4	0.09	Pb	<.01
			Na	11.5	BOD_5		DO	
			K		T. Coliform		TSS	
		6/27/74	Flow	57000	HCO_3		F. Coliform	14
			Temp.	18.3	CO_3		Cd	
			Turbidity	13	SO_4		Zn	
			S. Conductance	165	Cl		As	
			pH	8.25	F		Fe	
			Ca		NO_3	0.18	Cu	
			Mg		PO_4	0.03	Pb	
			Na		BOD_5		DO	9.7
			K		T. Coliform	159	TSS	18
		11/4/74	Flow		HCO_3		F. Coliform	0
			Temp	5.8	CO_3		Cd	
			Turbidity	<1	SO_4		Zn	
			S. Conductance	170	Cl		As	
			pH	8.1	F		Fe	
			Ca	34	NO_3	0.0	Cu	
			Mg	0	PO_4		Pb	
			Na		BOD_5		DO	8.8
			K		T. Coliform	13	TSS	0.0

TABLE XIII (Cont.)

SAMPLING STATION DESIGNATION	SAMPLING LOCATION	DATE SAMPLED						
Crow Creek near mouth Water Quality Bureau	20N21W28BAA	3/28/74	Flow		HCO_3	249	F. Coliform	
			Temp.	6.0	CO_3	0.0	Cd	<.001
			Turbidity		SO_4	24	Zn	0.01
			S. Conductance	452	Cl	7.4	As	0.002
			pH	8.0	F		Fe	0.49
			Ca	45	NO_3	33	Cu	<.01
			Mg	13.6	PO_4	.27	Pb	<.01
			Na	30	BOD_5		DO	
			K		T. Coliform		TSS	
		6/27/74	Flow	60	HCO_3		F. Coliform	66
			Temp.	19.0	CO_3		Cd	
			Turbidity	30	SO_4		Zn	
			S. Conductance	295	Cl		As	
			pH	8.3	F		Fe	
			Ca		NO_3	0.27	Cu	
			Mg		PO_4	0.41	Pb	
			Na		BOD_5		DO	8.3
			K		T. Coliform	130	TSS	75
		11/4/74	Flow	52	HCO_3		F. Coliform	2
			Temp.	9.8	CO_3		Cd	
			Turbidity	3.5	SO_4		Zn	
			S. Conductance	295	Cl		As	
			pH	8.7	F		Fe	
			Ca		NO_3	0.25	Cu	
			Mg	53	PO_4		Pb	
			Na	2.7	BOD_5		DO	10.7
			K		T. Coliform	2	TSS	0.0
Post Creek below Fish Hatchery Water Quality Bureau	19N20W23DBB	3/28/74	Flow		HCO_3	181	F. Coliform	
			Temp	2.0	CO_3	0	Cd	<0.001
			Turbidity		SO_4	4.8	Zn	0.01
			S. Conductance	311	Cl	1.8	As	0.002
			pH	8.1	F		Fe	0.41
			Ca	35	NO_3	0.32	Cu	0.01
			Mg	12.2	PO_4	0.03	Pb	<0.01
			Na	8.8	BOD_5		DO	
			K		T. Coliform		TSS	

TABLE XIII (Cont.)

SAMPLING STATION DESIGNATION	SAMPLING LOCATION	DATE SAMPLED						
Post Creek below Fish Hatchery Water Quality Bureau	19N20W23DBB	6/19/74	Flow		HCO_3	178	F. Coliform	
			Temp.		CO_3	0.0	Cd	<0.001 (2)
			Turbidity	65	SO_4	3.9	Zn	<.01 (2)
			S. Conductance	286	Cl	1.5	As	<.001 (2)
			pH	8.1	F		Fe	1.8 (2)
			Ca	34	NO_3		Cu	<.01 (2)
			Mg	12.	PO_4		Pb	
			Na	6.5	BOD_5		DO	8.0
			K	2.7	T. Coliform		TSS	94
		11/4/74	Flow	32	HCO_3		F. Coliform	
			Temp.	6.0	CO_3		Cd	
			Turbidity	3.4	SO_4		Zn	
			S. Conductance	295	Cl		As	
			pH	8.3	F		Fe	
			Ca	59	NO_3	0.9	Cu	
			Mg	0.2	PO_4		Pb	
			Na		BOD_5		DO	
			K		T. Coliform		TSS	6
Jocko River near Arlee, Water Quality Bureau	16N20W2BCA	3/28/74	Flow		HCO_3		F. Coliform	
			Temp.	8.0	CO_3		Cd	<.001
			Turbidity		SO_4		Zn	0.01
			S. Conductance		Cl		As	0.002
			pH		F		Fe	0.01
			Ca		NO_3	0.09	Cu	<.01
			Mg		PO_4	<.03	Pb	<.01
			Na		BOD_5		DO	
			K		T. Coliform		TSS	
		6/12/74	Flow	570	HCO_3	106	F. Coliform	0
			Temp	8.8	CO_3	0.0	Cd	
			Turbidity	6.5	SO_4	2.3	Zn	<.01
			S. Conductance	172	Cl	0.2	As	
			pH	8.2	F		Fe	0.33
			Ca	25	NO_3	0.16	Cu	<.01
			Mg	5.1	PO_4	0.03	Pb	
			Na	0.9	BOD_5		DO	9.9
			K	0.4	T. Coliform	22	TSS	21.0

TABLE XIII (Cont.)

SAMPLING STATION DESIGNATION	SAMPLING LOCATION	DATE SAMPLED						
Jocko River near Arlee Water Quality Bureau	16N20W2BCA	11/4/74	Flow		HCO_3		F. Coliform	
			Temp.		CO_3		Cd	
			Turbidity	<1	SO_4		Zn	
			S. Conductance		Cl		As	
			pH		F		Fe	
			Ca	56	NO_3	0.2	Cu	
			Mg	0.0	PO_4		Pb	
			Na		BOD_5		DO	9.7
			K		T. Coliform	0	TSS	0.0
Jocko River near Dixon Water Quality Bureau	18N21W20ABB	5/28/74	Flow		HCO_3		F. Coliform	
			Temp.	7.6	CO_3		Cd	<.001
			Turbidity		SO_4		Zn	<.01
			S. Conductance		Cl		As	.001
			pH		F		Fe	0.18
			Ca		NO_3	0.17	Cu	<.01
			Mg		PO_4	<0.03	Pb	<.01
			Na		BOD_5		DO	
			K		T. Coliform		TSS	
		11/4/74	Flow	94	HCO_3		F. Coliform	1
			Temp.	6.0	CO_3		Cd	
			Turbidity	<1	SO_4		Zn	
			S. Conductance	275	Cl		As	
			pH	8.6	F		Fe	
			Ca	56	NO_3	0.10	Cu	
			Mg	0.3	PO_4		Pb	
			Na		BOD_5		DO	11.9
			K		T. Coliform	3	TSS	3.0
Flathead River at Perma, U.S. Geological Survey Station #12388700	19N23W31BCB	8/9/73	Flow	5300	HCO_3	107	F. Coliform	17
			Temp	22.5	CO_3		Cd	
			Turbidity		SO_4	6.1	Zn	
			S. Conductance	190	Cl	1.1	As	
			pH	8.1	F		Fe	
			Ca		NO_3	0.0	Cu	
			Mg	24	PO_4	0.03	Pb	
			Na	6.1	BOD_5	0.2	DO	8.0
			K	1.8	T. Coliform	67	TSS	

TABLE XIII (Cont.)

SAMPLING STATION DESIGNATION	SAMPLING LOCATION	DATE SAMPLED						
Flathead River at Perma, U.S. Geological Survey Station #12388700	19N23W31BCB	6/9/72	Flow	50,300	HCO_3	100	F. Coliform	17
			Temp.	15.0	CO_3		Cd	
			Turbidity	7	SO_4		Zn	0.008
			S. Conductance	175	Cl		As	
			pH	8.3	F	0.0	Fe	0.010
			Ca		NO_3		Cu	
			Mg		PO_4		Pb	
			Na		BOD_5		DO	9.8
			K		T. Coliform	270	TSS	
Clark Fork near Plains, U.S. Geological Survey Station #12389000	19N26W1CA	11/12/69	Flow	6830	HCO_3	132	F. Coliform	0
			Temp.	6.5	CO_3		Cd	--
			Turbidity	2.0	SO_4		Zn	0.01
			S. Conductance	240	Cl	1.3	As	--
			pH	8.1	F	--	Fe	0.004
			Ca		NO_3	0.0	Cu	0.004
			Mg		PO_4		Pb	0.0
			Na	5.2	BOD_5	1.4	DO	11.1
			K	1.3	T. Coliform	7	TSS	
		1/14/70	Flow	18300	HCO_3	116	F. Coliform	--
			Temp.	0.0	CO_3		Cd	0.0
			Turbidity	6.0	SO_4		Zn	0.015
			S. Conductance	218	Cl	2.2	As	0.001
			pH	7.4	F	--	Fe	0.0
			Ca		NO_3	0.4	Cu	0.002
			Mg		PO_4		Pb	0.0
			Na	--	BOD_5	1.1	DO	12.0
			K	0.8	T. Coliform	7	TSS	
		6/9/70	Flow	86,900	HCO_3	79	F. Coliform	90
			Temp	14.0	CO_3		Cd	0.0
			Turbidity	45	SO_4		Zn	0.011
			S. Conductance	140	Cl	0.6	As	0.001
			pH	7.9	F	0.2	Fe	0.0
			Ca		NO_3	0.2	Cu	0.0
			Mg		PO_4		Pb	0.0
			Na		BOD_5	0.9	DO	9.7
			K	0.9	T. Coliform	550	TSS	

TABLE XIII (Cont.)

SAMPLING STATION DESIGNATION	SAMPLING LOCATION	DATE SAMPLED						
ClarkFork at Thompson Falls, U.S. Geological Survey Station #12391000	21N30W1DA	8/9/73	Flow	6100	HCO_3	111	F. Coliform	0
			Temp.	20.5	CO_3		Cd	
			Turbidity		SO_4	8.1	Zn	
			S. Conductance	200	Cl	1.5	As	
			pH	8.1	F	0.0	Fe	
			Ca	27	NO_3	0.0	Cu	
			Mg	7.2	PO_4	0.0	Pb	
			Na	3.2	BOD_5	0.7	DO	8.3
			K		T. Coliform	20	TSS	
		6/7/73	Flow	23,200	HCO_3	98	F. Coliform	3
			Temp.	14.5	CO_3		Cd	
			Turbidity		SO_4	8.6	Zn	
			S. Conductance	175	Cl	1.6	As	
			pH	8.2	F	0.1	Fe	
			Ca	24	NO_3	--	Cu	
			Mg	6.0	PO_4	--	Pb	
			Na	2.3	BOD_5	0.9	DO	9.7
			K	--	T. Coliform	20	TSS	
		6/9/70	Flow	98,000	HCO_3	76	F. Coliform	90
			Temp.	14.5	CO_3		Cd	0.0
			Turbidity	50	SO_4	00	Zn	0.01
			S. Conductance	140	Cl	0.8	As	0.0(
			pH	7.9	F	0.2	Fe	0.0
			Ca		NO_3	0.1	Cu	0.0
			Mg		PO_4	--	Pb	0.0
			Na		BOD_5	1.3	DO	10.4
			K	0.9	T. Coliform	230	TSS	
Prospect Creek near mouth Water Quality Bureau	22N30W7DDD	3/27/74	Flow		HCO_3	25	F. Coliform	
			Temp	6.8	CO_3	0.0	Cd	<.00
			Turbidity	1	SO_4	4.5	Zn	<.01
			S. Conductance	50	Cl	0.5	As	<.01
			pH	7.3	F		Fe	0.1
			Ca	5.6	NO_3	0.04	Cu	<.01
			Mg	1.1	PO_4	0.15	Pb	<.01
			Na	2.1	BOD_5		DO	
			K		T. Coliform		TSS	

TABLE XIII (Cont.)

SAMPLING STATION DESIGNATION	SAMPLING LOCATION	DATE SAMPLED						
Prospect Creek near mouth Water Quality Bureau	22N30W7DDD	7/31/74	Flow	150	HCO_3	29	F. Coliform	4
			Temp.	12.5	CO_3	0	Cd	
			Turbidity	<1	SO_4	2.0	Zn	<.01 (2)
			S. Conductance	51	Cl	0.0	As	
			pH	7.9	F		Fe	0.05
			Ca	5.1	NO_3	0.0	Cu	<.01 (2)
			Mg	1.9	PO_4	0.03	Pb	
			Na	1.6	BOD_5		DO	
			K		T. Coliform	70	TSS	<1.0
Bull River near mouth Water Quality Bureau	26N33W3BDB	3/27/74	Flow		HCO_3	60	F. Coliform	
			Temp.	6.0	CO_3	0.0	Cd	<.001
			Turbidity	<1	SO_4	2.8	Zn	<.01
			S. Conductance	99	Cl	0.1	As	<.01
			pH	7.7	F		Fe	0.08
			Ca	13.2	NO_3	0.08	Cu	<.01
			Mg	3.9	PO_4	<0.03	Pb	<.01
			Na	1.2	BOD_5		DO	
			K		T. Coliform		TSS	
		8/21/74	Flow	590	HCO_3	57	F. Coliform	
			Temp.	10.8	CO_3	0.0	Cd	<.001
			Turbidity	<1	SO_4	6.0	Zn	<.01
			S. Conductance	97	Cl	0.6	As	<.001
			pH	8.0	F		Fe	0.02
			Ca	13.1	NO_3		Cu	<.01
			Mg	4.0	PO_4	<.03	Pb	
			Na	1.0	BOD_5		DO	
			K		T. Coliform		TSS	
			Flow		HCO_3		F. Coliform	
			Temp		CO_3		Cd	
			Turbidity		SO_4		Zn	
			S. Conductance		Cl		As	
			pH		F		Fe	
			Ca		NO_3		Cu	
			Mg		PO_4		Pb	
			Na		BOD_5		DO	
			K		T. Coliform		TSS	

IX. WASTE DISCHARGE PERMITS

The Montana state program of issuing waste discharge permits is operated under authority of the Montana Water Pollution Control Law. Statutory authority to apply and enforce state compliance schedules in state permits are Sections 69-4806 (3), 4808.2 (1) and (2), 69-4820, 69-4820.1 and 69-4823, Revised Codes of Montana, 1947. The applicable rule is existing MAC 16-2.14(10)-S14460, Montana Pollutant Discharge Elimination System (MPDES), Section (2)(b)(ii), effective March 8, 1974.

Fifteen municipal, and four industrial waste discharge permits have been issued by the state or E.P.A. in the Lower Clark Fork drainage basin. As one condition of these permits all municipalities on compliance schedules are expected to meet secondary treatment requirements by July 1, 1977. Facility descriptions and effluent characteristics are discussed in Section VI.

Federal permits are issued pursuant to the National Pollutant Discharge Elimination System (NPDES) created by the Federal Water Pollution Control Act Amendments of 1972 (FWPCAA of 1972). To eliminate the duplication of effort which formerly existed, Montana was given the authority to administer the NPDES program in Montana on June 10, 1974. Section 402 of the FWPCAA of 1972 provides that states with adequate water pollution control program elements may apply for and receive authority from the E.P.A. to issue permits under the NPDES in their own states. Montana made the necessary revisions to the state water pollution control laws during the 1973 legislative session to provide the statutory authority for administration of the aforementioned NPDES program in Montana. In addition, the Board of Health and Environmental Sciences adopted a rule entitled the Montana Pollutant Discharge Elimination System (MPDES). The MPDES rule provides the additional program elements needed by the state to comply with rules and regulations promulgated by the administrator of E.P.A. pursuant to Section 304(h) of the FWPCAA of 1972. Section 304(h) relates to the state program elements necessary to administer the NPDES program.

TABLE XIV- NPDES PERMITS IN THE LOWER CLARK FORK DRAINAGE BASIN (Current as of March 12, 1975)

FACILITY & LOCATION (1)	NPDES PERMIT NO.	DATE ISSUED	EXPIRATION DATE	COMPLIANCE SCHEDULE
Missoula Sewage Treatment Plant 13N19W18CCD (2)	MT-0022594	7/15/74	3/31/77	5/31/75
Dailys Meats, Industrial (3) 13N19W17CBC	MT-0000094	2/20/74	12/31/75	7/1/75
Lolo Sewage Treatment Plant (2) 12N20W26ABA	MT-0020168	3/18/74	1/31/76	7/1/77
Hamilton Sewage Treatment Plant 06N21W25BBB (2)	MT-0020028	3/19/74	12/31/76	7/1/77
Darby Sewage Treatment Plant 03N21W11CDB (2)	MT-0021741	3/18/74	12/31/76	6/30/77
Stevensville Sewage Treatment Plant 09N20W27BAC (2)	MT-0022713	3/19/74	12/31/76	7/1/76
M & S Ready Mix, Industrial (3) 13N20W36CBD	MT-0023531	1/10/75	12/31/77	7/1/76
Superior Sewage Treatment Plant 17N26W34BBB (2)	MT-0020664	12/12/73	1/1/77	7/1/77
Alberton Sewage Treatment Plant 14N23W03ACA (2)	MT-0021555	12/12/73	7/1/77	7/1/77
Thompson Falls Sewage Treatment Plant (2) 21N29W06ACB	MT-0021784	12/12/73	1/1/77	7/1/77
Thompson Falls Dam Sewage Treatment Plant 21N29W08BCC	MT-0023159	9/16/74	6/30/79	None Required
Hoerner Waldorf, Industrial (3) 14N21W23A(all)	MT-0000035	12/2/74	12/31/77	7/15/75 & 2/28/77

TABLE XIV (Contd.)

FACILITY & LOCATION (1)	NPDES PERMIT NO.	DATE ISSUED	EXPIRATION DATE	COMPLIANCE SCHEDULE
Charlo Sewage (2) Treatment Plant 19N20W05CCB	MT-0022551	12/13/73	7/1/77	7/1/77
Hot Springs Sewage Treatment Plant 21N24W03BCB (2)	MT-0020591	12/22/74	6/30/79	7/1/75
Polson Sewage Treatment Plant 22N20W08AA (2)	MT-0020559	12/20/74	12/31/76	7/1/77
Ronan Sewage Treatment Plant 20N20W02CBA (2)	MT-0021474	3/25/74	7/1/77	7/1/77
Consolidated Dairy Ronan, Industrial 20N20W02DCA (3)	MT-0000108	1/29/74	6/30/76	1/1/76
St. Ignatius, BIA Sewage System (2) 18N20W14CAB	MT-0029017	2/25/75	12/31/76	7/1/77
St. Ignatius, Municipal Sewage System 18N20W14ABD (2)	MT-0020524	12/13/73	7/1/77	7/1/77

(1) See Appendix C
(2) Discharge must meet secondary effluent requirements by date specified
(3) Best practicable treatment by date specified

X. WASTE LOAD ALLOCATION

To prevent point source wastes from exceeding Montana's stream standards, waste loads to streams are allocated including an allowance for possible future changes in streams that may increase loads. All streams in the basin are designated as Effluent Limited except for the segment of the Clark Fork River extending from the Hoerner-Waldorf paper plant, near Missoula downstream to Alberton. This segment has had past problems of low dissolved oxygen and high color and possibly phenols. Treatment methods at the Hoerner-Waldorf plant are changing to include increased use of ground disposal. This will probably reduce the color and phenol problem. The dissolved oxygen problem has not been determined to be consistently present, but was identified in one survey during very low, warm water conditions. (Ref. 32).

Although there are other water quality problems in the basin, there are no segments that are known to be water quality limited thus no waste load allocations are needed.

The survey referred to above identified diurnal oxygen levels in the Clark Fork River below the 7.00 ppm level established in State water quality standards. The survey was conducted on a single day in August, 1973. The diurnal low oxygen concentrations reported in the survey were as follows:

TABLE XV : DIURNAL OXYGEN VARIATIONS
CLARK FORK RIVER

Station	Diurnal Low D.O. on August 2-3, 1973
Clark Fork at Rock Creek	5.2
Clark Fork at Deer Lodge	5.9
Clark Fork at Garrison	6.0
Clark Fork at Drummond	6.0
Clark Fork at Turah Campground	6.0
Clark Fork above Missoula STP	6.7
Clark Fork below Missoula STP	6.3
Clark Fork above Hoerner-Waldorf Plant	6.5
Clark Fork below Hoerner-Waldorf Plant	6.6
Clark Fork at Alberton	6.9
Clark Fork at Tarkio	7.0
Clark Fork at Superior	6.8

The dashed line indicates the upstream boundary of this Lower Clark Fork Management Plan.

The data presented above represents a single day's analysis, and this work has not been duplicated since 1973. Also, municipal and industrial changes since the survey have probably improved the dissolved oxygen situation.

It is apparent, on the day of the survey, that oxygen levels entering the Lower Clark Fork basin were already below state standards by about 1 ppm. It is also apparent that, if state standards had been maintained as far upstream as Deer Lodge, the dissolved oxygen above the Missoula sewage plant should have been approximately 7.8 ppm. In that event the 0.4 ppm oxygen drop below the Missoula plant would not have exceeded standards. Furthermore, it is noted that Clark Fork oxygen levels were on an improving trend throughout the Lower Clark Fork drainage with the single exception of the Missoula area. Finally, it is noted that the Missoula sewage plant has been upgraded to secondary treatment since the date of the survey.

In conclusion, it is apparent that waste load allocations are not necessary in the Lower Clark Fork drainage basin with respect to dissolved oxygen, even though state water quality standards are probably being exceeded relative to this parameter. Based on the discussion above, if water quality standards are maintained in the Upper Clark Fork drainage basin, there is no documented discharge or combination of discharges which will reduce dissolved oxygen levels below 7.0 ppm in the Lower Clark Fork drainage basin.

In view of the above discussion, the Missoula to Alberton segment of the Clark Fork River is herein redesignated as "effluent limited, not presently meeting standards." It is anticipated that future improvements upstream of the area covered by this management plan will result in standards being met in this segment.

The Montana Dept. of Fish & Game has indicated their belief that nutrients (from Hoerner Waldorf and Missoula STP) are raising the primary productivity of the Clark Fork River, causing algal growths, and depressing oxygen levels. This matter needs additional investigation, which should logically start with nutrient analyses of all Hoerner-Waldorf ponds, discharges and monitoring wells and of the Missoula STP effluent. Such a monitoring program is hereby recommended most appropriately to be administered through the MPDES discharge permit system.

XI. MANAGEMENT, STRATEGY AND SURVEILLANCE PLAN

MANAGEMENT STRATEGY

The objective of water quality management is to maintain or enhance the quality of waters within the basin. To accomplish this, management programs and plans must be developed and implemented within the basin. After development and implementation, waters and wastewaters in the basin must be checked to determine actual effectiveness of the management program. Water quality management is an interactive process; that is, a plan must be followed, the results checked, the plan modified and the results again checked. A management strategy contains a number of elements. These are:

1. Permits

   State and federal pollutant discharge permits are a basic tool in regulating the discharge of effluents to state waters. All discharges under the permit authority, either are or will be permitted or eliminated. The permit program regulates the quantity and quality of discharges of municipal and industrial wastes and certain agricultural wastes, including discharges from confined feeding operations and from irrigation drainage systems. The discharge permit also is used to regulate effluent from new or expanded discharges. As stream quality data are obtained, the permit can be used to insure that discharging effluents do not cause streams to exceed state water quality standards. All dischargers will be required, under the permit program to achieve best practicable control technology not later than July 1, 1977. All publicly owned treatment works must achieve secondary treatment by July 1, 1977. More stringent limitations may be placed as necessary to meet water quality standards.

2. Intensive Surveys

   Intensive water quality surveys are conducted for waters in the basin that have water quality problems. Objectives of intensive surveys are to determine pollution causes and potential means of elimination or abatement of pollutants. As additional water quality problems are identified within the basin, intensive surveys will be made. Intensive surveys also are conducted to determine the impact of specific wastewater discharges, land practices, or water treatment facilities that are installed in the basin.

3. Monitoring

   Monitoring includes a number of activities that provide measurement of chemical, physical and biological quality of water and changes in quality. Monitoring includes:

   (a) self-monitoring required by dischargers that are under the Pollutant Discharge Elimination System permit program

(b) compliance monitoring by the Water Quality Bureau and the EPA to ensure that permitted discharges are in compliance with allowable limits;

(c) periodic sampling and analysis of water at selected stations;

(d) aerial and ground observations of basin waters and practices or facilities that affect water quality;

(e) the use of continuous water quality recording instrumentation to obtain a continuous record of selected water quality parameters;

(f) short-duration surveys of stream segments to determine changes in quality in streams as the water progresses downstream;

(g) evaluation of water quality data to determine trends and to identify problems.

The basic objective of the monitoring effort is to determine the status of water quality and to determine variations in water quality. The monitoring network also is useful for determining the impact of activities within the basin that influence water quality. Such activities include those that potentially degrade water quality, such as logging, mining, and certain agricultural practices; and those activities that may enhance water quality, such as installation of improved treatment facilities.

4. Facilities construction, operation, and maintenance.

Federal and state grant programs are available to assist municipalities in the construction of sewage treatment facilities, which include outfall and interceptor sewers. Such facilities provide improved treatment of wastewaters and reduce the impact of wastewaters on the receiving water body. An integral part of the waste treatment facility program is adequate operation and maintenance of the facilities after construction is completed. The state requires that all operators be certified and the state provides on-the-job training and annual schools for operators.

5. Operation and maintenance.

Periodic inspections are made of municipal and industrial wastewater treatment facilities in the basin. The objective of operation and maintenance inspections is to ensure that waste treatment facilities are operated in a manner that provides the best possible treatment.

6. Information and Education.

Information is made available to the public through bureau publications, talks, technology transfer seminars, and through answering inquiries. Public hearings and environmental impact

statements are presented for important or controversial issues in the basin. Information and educational efforts are informing the public of water quality conditions in the basin and factors that can degrade water quality. This effort stresses development of a pollution prevention attitude.

7. Regulations and Guidelines.

To prevent water quality degradation within the basin, regulations and guidelines that relate to water quality will be made available to residents of the basin through state and county organizations. This includes regulations that influence water and wastewater from subdivisions and private and public water and wastewater facilities. In addition, existing regulations may be changed or updated to control activities within the basin that will degrade water quality. The Department of Health and Environmental Sciences in cooperation with other agencies, will develop guidelines that will abate or eliminate pollution resulting from storm drainage, storm sewer discharges and non-point sources, including irrigation practices, road building, construction, logging practices, overgrazing and other practices. Land use is recognized as a dominant factor controlling water quality in the basin. Those activities which influence land use will be examined to determine how water quality degradation due to improper land uses can be eliminated to be abated.

8. Enforcement.

Violations of Montana's laws, rules, or permits are investigated and are subject to injunction, civil penalties, or criminal penalties. The rules and regulations upon which enforcement is based are periodically reviewed and updated to insure that Montana's laws and regulations are adequate and can be properly enforced.

9. Program Coordination.

Montana's water pollution control program will be coordinated with other state, federal and local agencies to ensure that the activities of these groups receive adequate information with respect to their water quality related activities. This includes review of proposed programs, laws, regulations and proposed technical investigations that relate to water quality.

The elements of basin water quality management described above generally are applicable to all basins. Specific steps that will be taken in the Lower Clark Fork River basin are:

1. Permits.

Permit conditions and progress in meeting compliance schedules will be reviewed for all dischargers in the basin in FY 1976. All

permits will be reviewed prior to expiration to determine what revisions are needed for the reissued permits. All dischargers that have not received permits, but are under the NPDES or MPDES, will receive permits in FY 1976.

2. Intensive Surveys.

As water quality problems are identified and as funding is available, intensive surveys will be conducted. Potential areas for such surveys include the Little Bitterroot River, the small Flathead River tributaries on the Flathead Indian Reservation, and the several reservoirs in the same area.

3. Facilities Construction, Operation and Maintenance.

Inadequate municipal sewage treatment has been ranked according to priority (Appendix D) and will be upgraded to meet secondary treatment by July 1977. Industrial treatment of wastewater discharges will meet best practicable treatment by July 1977. Some EPA and state grant funds will be available for municipal sewage facilities. Sewage treatment plant operator training and the operatorssschool will be available for municipal sewage facilities. Sewage treatment plant operator training and the operators school will be available for the basin.

4. Operation and Maintenance.

At least one inspection will be made annually of each municipal sewage treatment facility in the Lower Clark Fork River basin. Critical installations will be provided additional inspections when needed and facilities with special operation and maintenance problems will be provided with technical assistance. Major industrial dischargers are examined at least twice per year and minor dischargers are examined as needed and as manpower and funding are available.

5. Information and Education.

The general bureau information and education program will be utilized in the basin. No specific basin programs are planned for the next year.

6. Regulations and Guidelines.

During the next year the regulatory framework for water pollution control will be reviewed by the bureau legal staff. The adequacy of the regulations to prevent pollution will be assessed.

7. Enforcement.

Enforcement actions will be taken as needed for prosecution of violations of the state's water pollution laws and regulations.

8. Program Coordination.

Federal, state and private organizations that have water quality related activities in the basin will be informed of the Bureau's efforts and will be requested to furnish information on these basin programs.

Monitoring and Surveillance

Water quality monitoring and surveillance programs represent a major investment of time and funds. Such programs should obtain the needed information at least cost. To properly design a cost-effective monitoring system, a number of factors must be considered including:

1. Adequacy of baseline data in the basin;

2. Status of the stream as a receiving water for pollutant discharges;

3. Data needs for point source discharges under state and federal permit programs;

4. Existing and potential water quality problems;

5. Data needs for enforcement actions;

6. Available time and funding;

7. Existence of other water quality data collection programs in the area.

Flexibility in scope and intensity is an important aspect of a proposed program. A variety of factors can influence an area's water quality; these include industrial, municipal, and agricultural developments, federal and state regulations, and water transfers. With the range of developments that can occur in a basin, a long-term management strategy cannot be efficiently developed. Water quality surveillance and monitoring is directed at short-term conditions (up to five years in the future) and is revised annually.

Monitoring and surveillance recommendations are presented in this report. The detailed basin monitoring and surveillance program is developed by the Water Quality Bureau as part of the annual water pollution control program plan. Monitoring and surveillance activities are conducted by a variety of organizations including communities and industries, federal and state agencies, private individuals and organizations. Commonly, accute problems such as toxic conditions causing fish kills, oil spills, etc. are recognized by basin residents or persons working in the basin.

The following is the recommended monitoring program for the Lower Clark Fork River Basin:

1. Compliance Monitoring.

   It is recommended that the following point discharges be checked by the Water Quality Bureau to check compliance with permit conditions.

Missoula	Charlo
Lolo	Hot Springs
Hamilton	Polson
Darby	Ronan
Stevensville	St. Ignatius (municipal)
Superior	Elmo
Alberton	Thompson Falls
	Thompson Falls Dam

   Suspended solids, BOD_5, fecal coliforms, and flow will be monitored in all municipal discharges; residual chlorine will be measured where chlorination is provided.

   Similarly, it is recommended that the following industrial discharges be monitored by the Water Quality Bureau to check compliance with permit conditions:

   M & S Ready-Mix, Missoula
   Daily's Meats, Missoula
   Consolidated Dairies, Ronan
   Hoerner-Waldorf Corp., Missoula

   Frequency and parameters to be monitored for irrigation return flows have not, as yet, been defined. Feedlots designed are basically as non-discharging facilities.

2. Self-Monitoring.

   All waste dischargers under MPDES permit are required to periodically sample and analyze their wastewater and report these results to the Bureau and the Environmental Protection Agency. The parameters to be monitored are specified in the conditions of the permit.

3. Water Quality Surveillance Network.

   As a portion of the statewide water quality surveillance network, three stations have been established for monitoring in the Lower Clark Fork Drainage Basin. The stations are described in the Montana Water Pollution Control Program Plan for fiscal year 1976, (Ref. 26) and are located as follows

   (a) Clark Fork River at Harpers Bridge (14N21W35ADA)-This station will provide an upstream control measure of water quality above the influences of the Hoerner-Waldorf paper plant. Sampling will include bi-monthly color, phenols, chemical oxygen demand, and total organic carbon. In addition, common constituents, nutrients and suspended solids will be measured quarterly, and benthic organisms will be examined annually.

(b) Clark Fork River at Huson Bridge (15N22W26ACB)-This station is located below the influences of the Hoerner-Waldorf paper plant. Sampling frequencies and parameters will be the same as the Harpers Bridge station.

(c) Bitterroot River at Maclay Bridge (13N20W26CBD)-This station will be sampled annually for a biological analysis of benthic organisms. The station, located near the river mouth, should provide an assessment of the temperature and dewatering effects upstream.

4. Aerial and Ground Surveys

Examination of streams and water bodies is done as part of the bureau visits to the basin. Other agencies and organizations also commonly notice stream conditions during their basin trips. Detailed aerial surveillance and actual stream examination on foot or by boat may be required for selected problems.

5. Data Interpretation and Analysis

Surveillance and monitoring activities develop water quality data that must be compared with previous data, water quality standards, permit conditons, etc. Results of water quality testing must be analyzed and interpreted to understand temporal and spatial changes in water quality and determine if the sampling network is adequate to meet program objectives.

Non-Point Strategy

Non-point sources of water pollution are receiving increased attention, particularly at the state and federal levels. It is anticipated that future federal water quality legislation may be directed toward defining and resolving non-point pollution problems.

The Flathead Drainage 208 Project is currently studying non-point problems associated with logging, grazing, cattle access and subdivision in the lower Flathead portion of the drainage.

On the state level, the Statewide 208 Study will be addressing non-point water quality problems. The details of the methods to be used are not known at this time, as this study is presently in its infancy.

XII. MUNICIPAL FACILITIES INVESTMENTS

State water quality standards in the Lower Clark Fork drainage basin will not be violated by any municipal discharges after the application of secondary treatment. Several facilities are in need of upgrading to meet secondary treatment standards. Needs, projected costs, and project status are summarized in Table XVI. Data to evaluate cost effectiveness of treatment needs were not available. Priority numbers assigned in Table XVI show only the ranking of projects within the Lower Clark Fork River basin. Relative ranking with projects statewide are given in Appendix E. The needs, costs, and scheduling information is primarily taken from the Montana Water Pollution Control Program Plan (Ref. 1).

TABLE XVI - MUNICIPAL SEWAGE TREATMENT NEEDS IN THE LOWER CLARK FORK BASIN

COMMUNITY (PRIORITY NO.)(1)	NEEDS DESCRIPTION	ESTIMATED LOAD (P.E.)	COST ESTIMATE	STATUS
Missoula (Not Appl.)	Complete Phase II construction for upgrading to secondary treatment.	35,000	Secondary treatment $975,000 (phase II)	Construction under way. Should be complete by late summer or fall, 1975.
Hamilton (19)	Need to reduce infiltration and construct secondary plant. Outlying areas need to be connected to sewage system.	3,000	Step I & II plans $30,000 Step III construction $270,000	Step I grant under way.
Darby (35)	Infiltration must be reduced, and lagoon must be upgraded to secondary.	350	Step I & II plans $7,500 Step III construction $37,500	Step I grant under way.
Stevensville (29)	Infiltration must be reduced, and lagoon must be upgraded to secondary.	800	Step I & II plans $37,500 Step III Construction $155,250	Step I facility plan under way.
Alberton (Not Appl.)	Chlorination needed for national secondary requirements. Plant must be assessed for compliance with secondary standards.	250	No estimate available.	Consulting engineer retained. Chlorination & flow weir may be included as part of existing grant which is essentially complete.
Polson (11)	Upgrade sewage lagoons to secondary treatment.	2,500	Step I $15,000	Consulting engineer retained.

TABLE XVI (Cont.)

COMMUNITY (PRIORITY NO.)(1)	NEEDS DESCRIPTION	ESTIMATED LOAD (P.E.)	COST ESTIMATE	STATUS
Ronan (none)	Sewage lagoon needs upgrading to secondary. Outlying areas need sewer service	1,300	No estimates available at this time.	No progress known. Compliance date 7/1/77, National secondary treatment.
Pablo (none)	New non-overflow system should be entirely adequate, but seepage from the lagoon should be evaluated	200	Evaluation would be inexpensive, but estimates not available.	No progress known.
Charlo (none)	Lagoon needs upgrading to secondary degree of treatment.	180	Step I $10,000	No progress known. National secondary treatment compliance date 7/1/77.
Hot Springs (49)	Activated sludge facility overloaded by infiltration and inflow. Needs sealing. Digester and chlorination changes needed.	650	Not available at this time.	Community has applied for priority rating for Step I grant, and has retained consulting engineer.
St. Ignatius BIA (not on list)(2)	Lagoons need upgrading to secondary degree of treatment. Infiltration in lagoon bottom apparent problem.	400	Not available at this time.	Under jurisdiction of B.I.A. No progress known to date.
St. Ignatius Municipal (48)	Lagoon needs upgrading to secondary degree of treatment.	600	Step I $15,000	No progress pending availability of grants for Step I. Compliance date 7/1/77.

TABLE XVI (Cont.)

COMMUNITY (PRIORITY NO.) (1)	NEEDS DESCRIPTION	ESTIMATED LOAD (P.E.)	COST ESTIMATE	STATUS
Kicking Horse Job Corps (not on list) (2)	Lagoon needs upgrading to secondary degree of treatment.	350	Not available at this time.	Under jurisdiction of B.I.A. No progress known to date.
Dixon Agency (not on list) (2)	Leakage from sewage lagoons should be assessed.	100	Not available at this time	Under jurisdiction of B.I.A. No progress known to date.
Thompson Falls (24)	Lagoon needs sealing, and lagoon needs upgrading to secondary treatment.	400	Step I, II, III grants $22,500	Step I facility plan under way.
Plains (82)	Community on septic tanks with failures not uncommon. Community sewer system needed.	Potential 1,000	None available at this time.	Priority has been too low to obtain Step I grant in the past.
Victor (5)	Unsewered community plans to construct a sewage collection and treatment facility	Potential 300	Step I $10,000 Steps II-III $300,000	Consulting engineer has been retained. Step I facility plan nearly complete. Abatement order issued.
Lolo (85)	Unsewered community on septic systems. Will need a sewage collection and treatment facility in future.	Potential estimated 400	None available at this time.	Low priority rating has prevented beginning of Step I facility plan.

TABLE XVI (Cont.)

COMMUNITY (PRIORITY NO.)(1)	NEEDS DESCRIPTION	ESTIMATED LOAD (P.E.)	COST ESTIMATE	STATUS
Corvallis (4)	Unsewered community plans to construct a sewage collection and treatment facility.	Potential 400	Step I $10,000 Steps II & III $250,000	Sewer district has been formed. Abatement order may be issued, and Step I may be under way in calendar 1975.
Superior (Not on list)	Assess efficiency of aerated lagoons to determine whether secondary treatment is being achieved. Install disinfection	500	Costs will depend on needs survey results. Disinfection estimated $2000	Compliance schedule established; self-monitoring under way.

(1) Priorities taken from Reference 1, where 119 communities are listed. Note that not all 119 communities will be applying for grant monies.

(2) Federal facilities not given state priority ratings.

XIII. PLANNING NEEDS

Section 208 of the Federal Water Pollution Control Act Amendments of 1972 provides grants to areas having special water quality problems which extend over local jurisdictional boundaries. The objective of these grants is to develop an overall water pollution control plan for the area. As part of plan preparation, local governments within the designated area are expected to establish an agency or agencies for implementing the water quality management plans, and the implementing agency or agencies would receive sewage treatment works construction grants. A Section 208 water quality plan will be written for the Flathead River drainage basin, including all of that drainage described in this report. There are several serious problems in the Flathead drainage that will be studied in the 208 effort, but as its duration is limited to two years, it is contemplated that some long-term problems will be defined for future work as well. Study needs in the Flathead drainage include necessary waste treatment facilities plans in Polson, Ronan, Charlo, Kicking Horse Job Corps, St. Ignatius (both systems) and Hot Springs. Sewer needs surveys for presently unsewered areas should be done in several areas including Ravalli and Arlee. Irrigation return flow problems and erosion problems should be studied in the Little Bitterroot River, Crow Creek, Post Creek, Jocko River, Mission Creek and several small creeks in the drainage.

In the remainder of the Lower Clark Fork drainage basin, one problem which occurs in most areas is logging activities. Poor logging practices can cause serious sedimentation, eliminate stream cover, alter stream beds, cause elevated temperatures, depress oxygen levels and contribute nutrients to the streams. Such problems are most prevalent when logging activities are conducted immediately adjacent to streams. An overall survey of logging practices and an assessment of the water quality effects is needed for the basin. Mining activity presently has little effect on water quality in the basin, but possible mineral developments in the West Fork Bitterroot, Bull and Vermilion Rivers may require background data studies.

Dewatering for agricultural purposes is a serious problem in the Bitterroot drainage. A study is needed to assess the effects on fish and other aquatic life and the dilution of waste discharges.

Facilities plans are needed in several other communities in the drainage, including Thompson Falls, Superior, Stevensville, Darby and Hamilton. Most of these plans are already underway. The sewage treatment needs and priorities are outlined in Section XII of this plan.

Special studies to determine the effectiveness of NPDES waste discharge permit conditions may be warranted in the future. For example, it may be necessary to re-study the effects of the Hoerner-Waldorf discharge on the Clark Fork River to determine whether permit conditions are adequate. Section XI of this plan describes two long-term state monitoring stations which will be situated near the Hoerner-Waldorf discharge points.

These problems and others defined in the basin are tabulated on Table XVII along with an assessment of the potential for corrections.

In the Missoula area, there is some interest in starting a Section 208 study. This is currently being pursued to determine whether sufficient interest is present to justify an application to EPA.

TABLE XVII SUMMARY OF WATER POLLUTION PROBLEMS IN THE LOWER CLARK FORK DRAINAGE BASIN

PROBLEM	STREAM OR AREA	STATUS	POTENTIAL FOR CORRECTION	METHODS OF CORRECTION
Municipal wastewater discharges that degrade stream quality. Problem severity low.	Bitterroot River, Clark Fork River, Flathead tributaries	Problem minor. All sewage plants are on NPDES permits. Communities are upgrading treatment processes. Flathead 208 Project will do facility plans for all inadequate systems in Flathead drainage; most other communities proceeding on their own.	Excellent. Possible shortage of federal construction funds may delay program.	Complete Section 201 facility plans for all sewage plants, not meeting secondary treatment requirements. Then, proceed with design and construction.
Water quality or public health hazards from unsewered communities utilizing septic tanks. Problem moderately severe in localized areas.	All unsewered communities, all parts of drainage.	No ongoing program. Unsewered communities less likely to construct sewage plants in future as costs escalate and governmental controls tighten. Surveys of all unsewered communities needed to determine severity of water quality or public health problems.	Poor to fair. Unless problems are severe, corrections must be initiated by local residents. Funding potential is poor for construction.	Problems need to be identified. Thereafter, community action programs and community education would be needed to form sewer districts and proceed with design and construction.
Hoerner-Waldorf pulp mill discharge to Clark Fork River, causing organic color and possibly phenols to exceed state water quality standards. Problem severity moderate.	Clark Fork River below Missoula.	Surface discharges allowed only during springtime high water, but seepage causes color problems during no-discharge periods.	Good. Technology not particularly well advanced for organic color reduction, however.	New treatment equipment is being installed. The effectiveness of this equipment must be evaluated after installation.
Logging can degrade water quality when activity is near flowing streams. Such activities may cause sedimentation, turbidity, organic color, and water temperature to increase, and oxygen to decrease. Problem severity localized; low to moderate.	Fringes of Flathead drainage; headwaters of Bitterroot drainage; most of Clark Fork drainage below St. Regis.	U.S. Forest Service controls have improved on federal lands. Little control on state or private lands. U.S. Forest Service is doing some water quality monitoring. Flathead 208 Project plans to address the problem in the Flathead portion of the basin.	Fair. The economically depressed lumber industry is not presently amenable to new controls. Federal lands management has been tightening somewhat.	Studies and surveys needed to determine how serious the problem is, and what are the best means of avoiding problems. Green strip setbacks from streams and avoidance of easily eroded areas are important considerations.

TABLE XVII (Contd.)

PROBLEM	STREAM OR AREA	STATUS	POTENTIAL FOR CORRECTION	METHODS OF CORRECTION
Confined livestock feeding and wintering operations cause some stream pollution and habitat degradation. Problem severity low to moderate.	Ranching areas in lower Flathead and upper Bitterroot areas.	Known feedlots are under permit program, which prohibits water pollution problems. However some small feedlots may not be identified, and thus not permitted.	Good. Cooperation has been generally quite good, once the operator has been convinced he is causing problems.	Usually wastes are held in tanks during winter and spread on fields in summer months.
Erosion causes sedimentation and turbidity in some areas, because of fragile soils, aggravated by human activities. Problem severe in one stream.	Little Bitterroot River.	Problem relatively static, but severe. Fragile soils, aggravated by severe overgrazing, erode readily during wet weather and with application of irrigation waters.	Poor. Fragile soils are extremely difficult to stabilize. Also, ranchers have resisted efforts of soils specialists to reduce overgrazing.	Convert flood irrigation to sprinkler irrigation. Also, eliminate overgrazing as recommended by SCS and county agents.
Irrigation return flows add sediment, salts and perhaps pesticides to receiving streams. Problem moderately severe in some areas.	Small tributaries of Flathead River, particularly east side. Also Bitterroot River.	Problem is partially self-correcting itself, as economics are causing farmers to convert to sprinkler irrigation, with no return flow waters. The conversion is a slow one, however, and regional power shortages could reverse this trend. Flathead 208 staff will address this problem in Flathead drainage.	Good. However, conversion to sprinkler irrigation could result in more stream dewatering.	Convert flood irrigation to sprinkler irrigation. Effects of return flows should be more adequately documented.
Dewatering of streams for agricultural use, reduces aquatic habitat and lessens dilution of wastewaters. Lower flows also result in increased temperatures. Problem is serious seasonally in several streams.	Bitterroot River, Little Bitterroot River, most east side tributaries of Flathead River.	Irrigation needs increase annually resulting in escalating withdrawals in some areas. Portions of the streams listed here become nearly dry seasonally. Montana Fish & Game Dept. is filing for minimum flow allocations for fish habitat on some streams.	Poor. With increasing demands on agricultural production, there is little hope that irrigation withdrawals from streams will decrease, or even remain static.	Legally allocate minimum flows for fish habitat. Perhaps educational program for irrigators to reduce unnecessary withdrawals.

TABLE XVII(Contd.)

PROBLEM	STREAM OR AREA	STATUS	POTENTIAL FOR CORRECTION	METHODS OF CORRECTION
Saline seep, may cuase increased stream salinity and loss of productive land. Effects on surface waters not thought to be serious at this time.	Little Bitterroot drainage.	Status of saline seep not known. While apparently not widespread, it is not known whether the seep areas are static or spreading. Effects on surface waters have not been documented.	Poor. Economically difficult problem, with technology not well developed.	Cropping practice changes. Stream sampling program needed to determine effects on surface waters.

PRIORITY DESIGNATIONS FOR PROBLEMS IDENTIFIED IN TABLE XVII*

STREAM SEGMENT	BEGINNING T.	BEGINNING R.	BEGINNING SEC.	END T.	END R.	END SEC.	COMMENTS
Clark Fork River (7) Missoula-to-Alberton	13N	19W	21	14N	23W	02	Dissolved oxygen low, organic color high, due in part to City of Missoula STP and Hoerner-Waldorf pulp mill
Bitterroot River drainage (2)	02N	20W	07	06N	21W	26	Logging effects, irrigation dewatering raising primary productivity, irrigation return flows with sediment and nutrients
Little Bitterroot River (1)	25N	24W	18	20N	21W	18	Dewatering, erosion, sedimentation
Crow Creek (4)	20N	20W	14	20N	21W	28	Irrigation return flows. Feedlot effects, dewatering increasing primary productivity
Post Creek (3)	19N	19W	24	18N	21W	04	Irrigation return flows, feedlot effects, dewatering; all contributing nutrients and raising primary productivity.
Mission Creek (6)	18N	20W	14	19N	20W	32	Irrigation return flows, feedlot effects, dewatering; all contributing nutrients and raising primary productivity
Jocko River (5)	16N	20W	01	18N	21W	17	Irrigation return flows; dewatering in some segments, pesticides problems

* Priority designation appears in ( ) after stream segment

XIV APPENDICES

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APPENDIX E - Public Hearing

APPENDIX A

GLOSSARY

Symbol	Definition
BOD_5	Five-day biochemical demand
cfs	Cubic feet per second
gpcd	Gallons per capita per day
gpd	Gallons per day
gpm	Gallons per minute
JTU	Jackson turbidity unit
lbs/capita/day	Pounds per capita per day
lbs/day	Pounds per day
ml	Milliliter
mgd	Million gallons per day
mg/l	Milligrams per liter
sq. ft.	Square feet
TR	Total recoverable
tpd	Tons per day
μmhos/cm	Micromhos per centimeter
$<$	Less than
$\leq$	Less than or equal to
$\geq$	Greater than or equal to
$\sim$	Approximately
BPT	Best practical treatment
WQB	Montana Department of Health & Environmental Sciences, Environmental Sciences Division, Water Quality Bureau
F & G	Fish and Game, Montana Department of
MDHES	Montana Department of Health & Environmental Sciences
MPDES	Montana Pollutant Discharge Elimination System
NPDES	National Pollutant Discharge Elimination System
BuRec	Bureau of Reclamation
EPA	U. S. Environmental Protection Agency
NOAA	National Oceanographic and Atmospheric Administration
SCS	U. S. Department of Agriculture, Soil Conservation Service.
USGS	U. S. Geological Survey
USPHS	U. S. Public Health Service

APPENDIX B

MONTANA STATE DEPARTMENT OF HEALTH
AND
ENVIRONMENTAL SCIENCES

MAC 16-2.14(10)-S14480 WATER QUALITY STANDARDS

(1) Policy statement. The following standards are adopted to establish maximum allowable changes in water quality and establish limits for pollutants which affect prescribed beneficial uses of state waters. The department adopts as a rule the policy that best practicable treatment and control of waste, activity and flow is to be provided to maintain dissolved oxygen and overall water quality at the highest possible levels, and water temperatures, coliform bacteria concentrations, dissolved chemical substances, toxic materials, radioactivity, turbidities, color, odor and other deleterious substances at the lowest possible levels.

(2) Application of standards. The water quality standards are composed of water-use classifications [section (4)], water-use descriptions and specific water quality criteria [section (5)], and general water quality criteria [section (6)].

(a) General water quality criteria apply to all state waters except where in this rule specific water quality criteria are more applicable to a specific water-use classification.

(b) In order to carry out the objective of the rule, existing discharges to state waters shall be brought into compliance with the standards as soon as practicable, and in no case later than three years from the effective date of the rule.

(3) Definitions. Unless statutory definition or the context otherwise requires in this rule:

"Conduit" means any artificial or natural duct, either open or closed, for conveying liquids or other fluids.

"Dewatered stream" means a perennial or intermittent stream whose water has been removed for one or more beneficial uses.

"EPA" means the U. S. Environmental Protection Agency.

"Intermittent stream" means a stream or portion of a stream that flows only in direct response to precipitation; it receives little or no water from springs and no long-continued supply from melting snow or other sources.

"Naturally occurring" means conditions or material present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil and water conservation practices have been applied. Conditions resulting from dams in existence as of July 1, 1971 are natural.

"Mixing zone" means that volume of state water wherein any pollutant may exceed allowable water quality standards.

Yankee Doodle Creek drainage to and including the Butte water supply reservoir . . . . . A-Closed

Remainder of Yankee Doodle Creek drainage to Anaconda Company tailings pond . . . . . $B\text{-}D_1$

Blacktail Deer Creek drainage except portion of Basin Creek listed below . . . . . $B\text{-}D_1$

Basin Creek drainage to and including the Butte water supply reservoir . . . . . A-Closed

Remainder of Basin Creek drainage . . . . . $B\text{-}D_1$

All other tributaries to Silver Bow Creek from the confluence of Blacktail Deer Creek to Warm Springs Creek . . . . . $B\text{-}D_1$

Clark Fork River (mainstem) from Warm Springs Creek to Cottonwood Creek . . . . . $C\text{-}D_2$

Clark Fork River (mainstem) from Cottonwood Creek to the Little Blackfoot River . . . . . $C\text{-}D_1$

Tin Cup Joe Creek drainage to the Deer Lodge water supply intake . . . . . A-Closed

Remainder of Tin Cup Joe drainage . . . . . $B\text{-}D_1$

Clark Fork River drainage from the Little Blackfoot River to the Idaho state line except those portions of tributaries listed below . . . . . $B\text{-}D_1$

Georgetown Lake and tributaries above Georgetown Dam . . . A-Open-D_1

Flint Creek drainage from Georgetown Dam to Farm-to-Market Highway No. 348 bridge about one mile west of Philipsburg except those portions of tributaries listed below . . . . . $B\text{-}D_1$

Fred Burr Lake and headwaters from source to the outlet of the lake . . . . . A-Closed

Flint Creek (mainstem) from Farm-to-Market Highway No. 348 bridge about one mile west of Philipsburg to the Clark Fork River . . . . . $B\text{-}D_1$

South Boulder Creek drainage to the Philipsburg water supply intake . . . . . A-Open-D_1

Remainder of South Boulder drainage . . . . . $B\text{-}D_1$

All other tributaries to Flint Creek from Farm-to-Market Highway No. 348 bridge to the Clark Fork River . . . . . $B\text{-}D_1$

Rattlesnake drainage to the Missoula water supply intake . . . . A-Closed

Remainder of Rattlesnake drainage . . . . . B-D_1

Packer and Silver Creek drainage (tributaries to the St. Regis River) to the Saltese water supply intake . . . . . A-Open-D_1

Remainder of Packer and Silver Creek drainages . . . . . B-D_1

Ashley Creek drainage to the Thompson Falls water supply intake A-Closed

Remainder of Ashley Creek drainage . . . . . B-D_1

Pilgrim Creek drainage to the Noxon water supply intake . . . . A-Open-D_1

Remainder of Pilgrim Creek drainage . . . . . B-D_1

All tributaries of Clark Fork River not otherwise mentioned . . B-D_1

Flathead River:

Flathead River drainage (except tributaries in Glacier National Park or in nationally designated wild, wilderness or primitive areas) except tributaries and lakes or reservoirs listed below . . . . . B-D_1

(Simply as a note for clarification, the Flathead River below the highway bridge at Polson to Paradise is included in the B-D_1 classification of the Flathead River drainage listed above.)

Crow Creek drainage to road crossing at Section 16, T20N, R20W about 2.5 miles southwest of Ronan except the portion of Second Creek listed below . . . . . B-D_1

Second Creek drainage to the Ronan water supply intake . . A-Closed

Remainder of Second Creek drainage . . . . . B-D_1

Crow Creek (mainstem) from road crossing in Section 16, T20N, R20W to the Flathead River . . . . . B-D_2

Tributaries to Crow Creek from road crossing in Section 16 to the Flathead River . . . . . B-D_1

Little Bitterroot River drainage to Hubbart Reservoir . . . . . B-D_1

Little Bitterroot River (mainstem) from Hubbart Reservoir dam to the Flathead River . . . . . B-D_2

Tributaries to the Little Bitterroot River from Hubbart Reservoir to the Flathead River except Hot Springs Creek listed below . . . . . B-D_1

Hot Springs Creek drainage to the Hot Springs water supply intake . . . . . A-Closed

Hot Springs Creek (mainstem) from the Hot Springs water supply intake to the Little Bitterroot River . . . . E-F

Tributaries to Hot Springs Creek (if any) from the Hot Springs water supply intake to the Little Bitterrot River . B-D_1

Mission Creek drainage to the St. Ignatius water supply intake . A-Open-D_1

Mission Creek drainage from the St. Ignatius water supply intake to U. S. Highway No. 93 crossing about one mile west of St. Ignatius . . . . . B-D_1

Mission Creek (mainstem) from U. S. Highway No. 93 crossing to the Flathead River . . . . . B-D_2

Tributaries to Mission Creek from the U. S. Highway No. 93 crossing to the Flathead River . . . . . B-D_1

(5) Water-use description and specific water quality criteria.

(a) General. Specific water quality criteria, along with criteria in section (6) protect the beneficial water uses set forth in the water-use descriptions for the following classifications of water. Criteria for organisms of the coliform group are based on a minimum of five samples obtained during separate 24-hour periods during any consecutive 30-day period analyzed by the most probable number or equivalent membrane filter methods. The metal limits on the Clark Fork River [section (6)] are to govern when this section (5) imposes a conflicting requirement with that criteria.

(b) A-Closed classification.

(i) Water-use description. Water supply for drinking, culinary and food processing purposes suitable for use after simple disinfection. Public access and activities such as livestock grazing and timber harvest are to be controlled by the utility owner under conditions prescribed and orders issued by the department. Only those waters on which access is presently controlled by the utility owner have been classified as A-Closed. If other uses are permitted, the waters are to be reclassified A-Open-D_1.

(ii) Specific water quality criteria.

(aa) The average number of organisms in the coliform group is not to exceed 50 per 100 milliliters.

(ab) Dissolved oxygen criteria are not applicable for the classification.

(ac) No change from natural pH is allowed.

(ad) No increase above naturally occurring turbidity is allowed.

(ae) No increase above naturally occurring water temperature is allowed.

(af) No increases above naturally occurring concentrations of sediment, settleable solids or residues, which adversely affect the use indicated, are allowed.

(ag) No increases of toxic or other deleterious substances, pesticides and organic and inorganic materials including heavy metals, above naturally occurring concentrations, are allowed.

(ah) No wastes are allowed which increase radioactivity above natural background levels.

(c) A-Open-D_1 classification.

(i) Water-use description. Water supply for drinking, culinary and food processing purposes suitable for use after simple disinfection and removal of naturally present impurities. Water quality is to be maintained suitable for bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply. Where the waters are used for swimming or other water-contact sports, analyses are to be made by the utility owner and the department to determine if a higher degree of treatment is required for potable water use.

Waters, if shown to meet the A-Closed criteria, may be so classified by the department at the request of the utility owner. State waters within the boundaries of national parks and nationally designated wild, wilderness or primitive areas in the state are classified A-Open-D_1 except those adjacent to developed areas such as Snyder Creek through the community of Lake McDonald and Swiftcurrent Creek below the Many Glacier Chalet, both in Glacier National Park. Also, Georgetown, Flathead and Whitefish lakes and Lake Mary Ronan are classified A-Open-D_1 as are some streams presently used for domestic water supply.

(ii) Specific water quality criteria.

(aa) The average number of organisms in the coliform group is not to exceed 50 per 100 milliliters where demonstrated to be the result of domestic sewage.

(ab) Dissolved oxygen concentration is not to be reduced below 7.0 milligrams per liter.

(ac) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 8.5 is to be less than 0.5 pH unit. Natural pH outside this range is to be maintained without change. Natural pH above 7.0 is to be maintained above 7.0.

(ad) No increase above naturally occurring turbidity is allowed.

(ae) A 1° F maximum increase above naturally occurring water temperature is allowed within the range of 32° F to 66° F; within the naturally occurring range of 66° F to 66.5° F, no discharge is allowed which will cause the water temperature to exceed 67° F; and where the naturally occurring water temperature is 66.5° F or greater, the maximum allowable increase in water temperature is 0.5° F. A 2° F per hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55° F, and a 2° F maximum decrease below naturally occurring water temperature is allowed within the range of 55° F to 32° F.

(af) No increases above naturally occurring concentrations of sediment, settleable solids or residues, which adversely affect the use indicated, are allowed.

(ag) Concentrations of toxic or other deleterious substances, pesticides and organic and inorganic materials including heavy metals, after treatment for domestic use, are not to exceed the recommended limits established in the 1962 U. S. Public Health Service Drinking Water Standards or subsequent editions; an increase of more than 10 percent of the concentration present in the receiving water is not allowed; maximum allowable concentrations are to be less than acute or chronic problem levels as revealed by bioassay or other methods.

(ah) True color is not to be increased more than two units above naturally occurring color.

(d) B-D_1 classification.

(i) Water-use description. The quality is to be maintained suitable for drinking, culinary and food processing purposes after adequate treatment equal to coagulation, sedimentation, filtration, disinfection and any additional treatment necessary to remove naturally present impurities; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

(ii) Specific water quality criteria.

(aa) The average number of organisms in the fecal coliform group is not to exceed 200 per 100 milliliters, nor are 10 percent of the total samples during any 30-day period to exceed 400 fecal coliforms per 100 milliliters. The average number of organisms in the coliform group is not to exceed 1,000 per 100 milliliters, nor are 20 percent of the samples to exceed 1,000 coliforms per 100 milliliters during any 30-day period.

(ab) Dissolved oxygen concentration is not to be reduced below 7.0 milligrams per liter.

(ac) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 8.5 is to be less than 0.5 pH unit. Natural pH outside this range is to be maintained without change. Natural pH above 7.0 is to be maintained above 7.0.

(ad) The maximum allowable increase above naturally occurring turbidity is 5 Jackson Candle Units except as is permitted in the general water quality criteria.

(ae) A 1° F maximum increase above naturally occurring water temperature is allowed within the range of 32° F to 66° F; within the naturally occurring range of 66° F to 66.5° F, no discharge is allowed which will cause the water temperature to exceed 67° F; and where the naturally occurring water temperature is 66.5° F or greater, the maximum allowable increase in water temperature is 0.5° F. A 2° F per hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55° F, and a 2° F maximum decrease below naturally occurring water temperature is allowed within the range of 55° F to 32° F.

This applies to all waters in the state classified B-D_1 except for Prickly Pear Creek from McClellan Creek to the Montana Highway No. 433 crossing where a 2° F maximum increase above naturally occurring water temperature is allowed within the range of 32° F to 65° F; within the naturally occurring range of 65° F to 66.5° F, no discharge is allowed which will cause the water temperature to exceed 67° F; and where the naturally occurring water temperature is 66.5° F or greater, the maximum allowable increase in water temperature is 0.5° F.

(af) No increases above naturally occurring concentrations of sediment, settleable solids or residues, which adversely affect the use indicated, are allowed.

(ag) Concentrations of toxic or other deleterious substances, pesticides and organic and inorganic materials including heavy metals, after treatment for domestic use, are not to exceed the recommended limits contained in the 1962 U. S. Public Health Service Drinking Water Standards or subsequent editions; also, maximum allowable concentrations are to be less than acute or chronic problem levels as revealed by bioassay or other methods.

(ah) True color is not to be increased more than five units above naturally occurring color.

(e) <u>B-D_2 classification.</u>

(i) Water-use description. The quality is to be maintained suitable for drinking, culinary and food processing purposes after adequate treatment equal to coagulation, sedimentation, filtration, disinfection and any additional treatment necessary to remove naturally present impurities; bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

(ii) Specific water quality criteria.

(aa) The average number of organisms in the fecal coliform group is not to exceed 200 per 100 milliliters nor are 10 percent of the total samples during any 30-day period to exceed 400 fecal coliforms per 100 milliliters. The average number of organisms in the coliform group is not to exceed 1,000 per 100 milliliters nor are 20 percent of the samples to exceed 1,000 coliforms per 100 milliliters during any 30-day period.

(ab) Dissolved oxygen concentration is not to be reduced below 7.0 milligrams per liter from October 1 through June 1 nor below 6.0 milligrams per liter from June 2 through September 30.

(ac) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 9.0 is to be less than 0.5 pH unit. Natural pH outside this range is to be maintained without change. Natural pH above 7.0 is to be maintained above 7.0.

(ad) The maximum allowable increase above naturally occurring turbidity is 10 Jackson Candle Units, except as is permitted in the general water quality criteria.

(ae) A 1° F maximum increase above naturally occurring water temperature is allowed within the range of 32° F to 66° F; within the naturally occurring range of 66° F to 66.5° F, no discharge is allowed which will cause the water temperature to exceed 67° F; and where the naturally occurring water temperature is 66.5° F or greater, the maximum allowable increase in water temperature is 0.5° F. A 2° F per hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55° F, and a 2° F maximum decrease below naturally occurring water temperature is allowed within the range of 55° F to 32° F.

(af) No increases above naturally occurring concentrations of sediment, settleable solids or residues, which adversely affect the use indicated, are allowed.

(ag) Concentrations of toxic or other deleterious substances, pesticides and organic and inorganic materials including heavy metals, after treatment for domestic use, are not to exceed the recommended limits contained in the 1962 U. S. Public Health Service Drinking Water Standards or subsequent editions; also, maximum allowable concentrations are to be less than acute or chronic problem levels as revealed by bioassay or other methods.

(ah) True color is not to be increased more than five units above naturally occurring color.

(f) <u>B-D3 classification</u>.

From the water diversion at Intake to the North Dakota state line, a 3° F maximum increase above naturally occurring water temperature is allowed within the range of 32° F to 82° F; within the range of 82° F to 84.5° F, no thermal discharge is allowed which will cause the water temperature to exceed 85° F; and where the naturally occurring water temperature is 84.5° F or greater, the maximum allowable increase in water temperature is 0.5° F.

(af) No increases above naturally occurring concentrations of sediment, settleable solids or residues, which adversely affect the use indicated, are allowed.

(ag) Concentrations of toxic or other deleterious substances, pesticides and organic and inorganic materials including heavy metals, after treatment for domestic use, are not to exceed the recommended limits contained in the 1962 U. S. Public Health Service Drinking Water Standards or subsequent editions; also, maximum allowable concentrations are to be less than acute or chronic problem levels as revealed by bioassay or other methods.

(ah) True color is not to be increased more than five units above naturally occurring color.

(g) C-D_1 classification.

(i) Water-use description. The quality is to be maintained suitable for bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers, and agricultural and industrial water supply.

(ii) Specific water quality criteria.

(aa) The average number of organisms in the fecal coliform group is not to exceed 200 per 100 milliliters nor are 10 percent of the total samples during any 30-day period to exceed 400 fecal coliforms per 100 milliliters. The average number of organisms in the coliform group is not to exceed 1,000 per 100 milliliters nor are 20 percent of the samples to exceed 1,000 coliforms per 100 milliliters during any 30-day period.

(ab) Dissolved oxygen concentration is not to be reduced below 7.0 milligrams per liter.

(ac) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 8.5 is to be less than 0.5 pH unit. Natural pH outside this range is to be maintained without change. Natural pH above 7.0 is to be maintained above 7.0.

(i) Water-use description. The quality is to be maintained suitable for drinking, culinary and food processing purposes after adequate treatment equal to coagulation, sedimentation, filtration, disinfection and any additional treatment necessary to remove naturally present impurities; bathing, swimming and recreation; growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

(ii) Specific water quality criteria.

(aa) The average number of organisms in the fecal coliform group is not to exceed 200 per 100 milliliters nor are 10 percent of the total samples during any 30-day period to exceed 400 fecal coliforms per 100 milliliters. The average number of organisms in the coliform group is not to exceed 1,000 per 100 milliliters nor are 20 percent of the samples to exceed 1,000 coliforms per 100 milliliters during any 30-day period.

(ab) Dissolved oxygen concentration is not to be reduced below 5.0 milligrams per liter.

(ac) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 9.0 is to be less than 0.5 pH unit. Natural pH outside this range is to be maintained without change. Natural pH above 7.0 shall be maintained above 7.0.

(ad) The maximum allowable increase above naturally occurring turbidity is 10 Jackson Candle Units, except as is permitted in the general water quality criteria.

(ae) A 3° F maximum increase above naturally occurring water temperature is allowed within the range of 32° F to 77° F; within the naturally occurring range of 77° F to 79.5° F, no thermal discharge is allowed which will cause the water temperature to exceed 80° F; and where the naturally occurring water temperature is 79.5° F or greater, the maximum allowable increase in water temperature is 0.5° F. A 2° F per hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55° F, and a 2° F maximum decrease below naturally occurring water temperature is allowed within the range of 55° F to 32° F.

This applies to all waters in the state classified B-D3, except from the Billings water supply intake to the water diversion at Intake, a 3° F maximum increase above naturally occurring water temperature is allowed within the range of 32° F to 79° F; within the range of 79° F to 81.5° F, no thermal discharge is allowed which will cause the water temperature to exceed 82° F; and where the naturally occurring water temperature is 81.5° F or greater, the maximum allowable increase in water temperature is 0.5° F.

(ad) The maximum allowable increase above naturally occurring turbidity is 5 Jackson Candle Units, except as is permitted in the general water quality criteria.

(ae) A 1° F maximum increase above naturally occurring water temperature is allowed within the range of 32° F to 66° F; within the naturally occurring range of 66° F to 66.5° F, no discharge is allowed which will cause the water temperature to exceed 67° F; and where the naturally occurring water temperature is 66.5° F or greater, the maximum allowable increase in water temperature is 0.5° F. A 2° F per hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55° F, and a 2° F maximum decrease below naturally occurring water temperature is allowed within the range of 55° F to 32° F.

(af) No increases above naturally occurring concentrations of sediment, settleable solids or residues, which adversely affect the use indicated, are allowed.

(ag) Concentrations of toxic or other deleterious substances, pesticides and organic and inorganic materials including heavy metals, are not to exceed levels known or demonstrated to be of public health significance; also maximum allowable concentrations are to be less than acute or chronic problem levels as revealed by bioassay or other methods.

(ah) True color is not to be increased more than five units above naturally occurring color.

(h) C-D2 classification.

(i) Water-use description. The quality is to be maintained for bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.

(ii) Specific water quality criteria.

(aa) The average number of organisms in the fecal coliform group is not to exceed 200 per 100 milliliters nor are 10 percent of the total samples during any 30-day period to exceed 400 fecal coliforms per 100 milliliters. The average number of organisms in the coliform group is not to exceed 1,000 per 100 milliliters nor are 20 percent of the samples to exceed 1,000 coliforms per 100 milliliters during any 30-day period.

(ab) Dissolved oxygen concentration is not to be reduced below 7.0 milligrams per liter from October 1 through June 1 nor below 6.0 milligrams per liter from June 2 through September 30.

(ac) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 9.0 is to be less than 0.5 pH unit. Natural pH outside this range is to be maintained without change. Natural pH above 7.0 is to be maintained above 7.0.

(ad) The maximum allowable increase above naturally occurring turbidity is 10 Jackson Candle Units, except as is permitted in the general water quality criteria.

(ae) A 1° F maximum increase above naturally occurring water temperature is allowed within the range of 32° F to 66° F; within the naturally occurring range of 66° F to 66.5° F, no discharge is allowed which will cause the water temperature to exceed 67° F; and where the naturally occurring water temperature is 66.5° F or greater, the maximum allowable increase in water temperature is 0.5° F. A 2° F per hour maximum decrease below naturally occurring water temperature is allowed when the water temperature is above 55° F, and a 2° F maximum decrease below naturally occurring water temperature is allowed within the range of 55° F to 32° F.

(af) No increases above naturally occurring concentrations of sediment, settleable solids or residues, which adversely affect the use indicated, are allowed.

(ag) Concentrations of toxic or other deleterious substances, pesticides and organic and inorganic materials including heavy metals, are not to exceed levels known or demonstrated to be of public health significance; also maximum allowable concentrations are to be less than acute or chronic problem levels as revealed by bioassay or other methods.

(ah) True color is not to be increased more than five units above naturally occurring color.

(d) E-F classification.

(i) Water-use description. The quality is to be maintained for agricultural and industrial water uses other than food processing.

(ii) Specific water quality criteria.

(aa) The average number of organisms in the fecal coliform group is not to exceed 200 per 100 milliliters nor are 10 percent of the total samples during any 30-day period to exceed 400 fecal coliforms per 100 milliliters. The average number of organisms in the coliform group is not to exceed 1,000 per 100 milliliters nor are 20 percent of the samples to exceed 1,000 coliforms per 100 milliliters during any 30-day period.

(ab) Dissolved oxygen concentration is not to be reduced below 3 milligrams per liter.

(ac) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 9.5 is to be less than 0.5 pH unit. Natural pH outside this range is to be maintained without change. Natural pH above 7.0 is to be maintained above 7.0.

(ad) Naturally occurring turbidity, naturally occurring water temperatures and naturally occurring concentrations of sediments, settleable solids or residues are not to be increased in quantity or amounts which adversely affect the use indicated.

(ae) Concentrations of toxic or deleterious substances, pesticides and organic and inorganic materials including heavy metals, are to be less than those demonstrated to be deleterious to livestock or plants or their subsequent consumption by humans or to adversely affect other indicated uses.

(6) General water quality criteria.

(a) The degree of waste treatment required to restore and maintain the standards is to be determined by the department and is to be based on the following.

(i) The state's policy of nondegradation of existing high water quality as described in Section 69-4808.2, R.C.M. 1947.

(ii) Present and anticipated beneficial uses of the receiving water.

(iii) The quality and nature of flow of the receiving water.

(iv) The quantity and quality of the sewage, industrial waste or other waste to be treated.

(v) The presence or absence of other sources of pollution on the same watershed.

(b) Sewage is to receive a minimum of secondary treatment as defined by EPA in accordance with requirements as set forth in the Federal Water Pollution Control Act Amendments of 1972.

(c) Industrial waste is to receive, as a minimum, treatment equivalent to the best practicable control technology currently available (BPCT) as defined by EPA. In cases where BPCT is not defined by EPA, industrial waste is to receive, after maximum practicable in-plant control, a minimum of secondary treatment or equivalent.

(d) For design of disposal systems, stream flow dilution requirements are to be based on minimum consecutive seven-day average flow which may be

expected to occur on the average of once in ten years. When dilution flows are less than the above design flow at a point discharge, the discharge is to be governed by the permit conditions developed for the discharge through the waste discharge permit program.

(e) State surface waters are to be free from substances attributable to municipal, industrial, agricultural practices or other discharges that will:

(i) Settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines.

(ii) Create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials.

(iii) Produce odors, colors or other conditions as to create a nuisance or render undesirable tastes to fish flesh or make fish inedible.

(iv) Create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life.

(v) Create conditions which produce undesirable aquatic life.

(f) No wastes are to be discharged and no activities conducted such that the wastes or activities, either alone or in combination with other wastes or activities, will violate, or can reasonably be expected to violate, any of the standards; (e.g., in a reach of stream classified B-D_1, the total allowable cumulative increase to naturally occurring turbidity conditions in the reach is 5 Jackson Candle Units).

(g) No wastes are to be discharged and no activities conducted which, either alone or in combination with other wastes or activities, will cause turbidities to exceed those allowed by specific water quality criteria; provided, short-term activities necessary to accommodate essential dredging, channel or bank alterations, stream diversions or other construction where turbidities in excess of the criteria are unavoidable, may be authorized by the department under conditions as it may prescribe.

(h) Methods of sample collection, preservation and analysis used to determine compliance with the standards are to be in accordance with the latest edition of Standard Methods for the Examination of Water and Wastewater published by the American Public Health Association or in accordance with tests or procedures that have been found to be equally or more applicable.

(i) For operations of existing water impoundments that cause conditions harmful to prescribed beneficial uses of state waters, it is to be

demonstrated to the satisfaction of the department that continued operations will be done in the best practicable manner to minimize harmful effects and will not violate state laws or department rules. New water impoundments shall be designed to provide temperature variations in discharging water that maintain or enhance the existing propagating fishery and associated aquatic life. As a guide, the following temperature variations are recommended: Continuously less than 40° F during the months of January and February, and continuously greater than 44° F during the months of June through September.

(j) Ponds for waste treatment purposes are not to be located in drainage ways where the volume of drainage water from a 10-year storm entering the ponds exceeds one-half the volume of the pond; provided that, subject to approval by the department as to design and maintenance, ponds located in drainage ways for the express purpose of containing emergency oil spills are permitted.

(k) Dumping of snow from municipal and/or parking lot snow removal activities into waters of the state is prohibited without a permit from the department.

(l) Existing discharges to state waters will be entitled a mixing zone as determined by the department.

(m) Until such time as minimum stream flows are established for dewatered streams, the minimum treatment requirements for discharges to dewatered receiving streams are to be no less than the minimum treatment requirements prescribed.

(n) Treatment requirements for discharges to intermittent streams are to be no less than the minimum treatment requirements prescribed.

(o) Pollution resulting from storm drainage, storm sewer discharges, and non-point sources, including irrigation practices, road building, construction, logging practices, overgrazing and other practices, are to be eliminated or minimized as ordered by the department.

(p) Application of pesticides in or adjacent to state waters is to be in compliance with the labeled direction, and in accordance with provisions of the Montana Pesticides Act (Title 27, Chapter 2, R.C.M. 1947) and the Federal Environmental Pesticides Control Act (Public Law 92-516). Excess pesticides and pesticide containers are not to be disposed of in a manner or in a location where they are likely to pollute state waters.

(q) The following radiological criteria shall apply to all waters except those classified as A-Closed:

(i) The average dissolved concentrations (including the naturally occurring or background contribution) of iodine 131, radium-226, strontium-89, strontium-90 and tritium are not to exceed the following concentration limits:

Iodine-131	5 pCi/L
Radium-226	1 pCi/L
Strontium-89	100 pCi/L
Strontium-90	10 pCi/L
Tritium	3,000 pCi/L

For all other radionuclides, the average dissolved concentration limits are to be 1/150 of the corresponding maximum permissible concentration in water for continuous occupational exposure as recommended by the National Committee on Radiation Protection (National Bureau of Standards Handbook 69 or subsequent revisions.)

(ii) For a mixture of radionuclides, the following relationship is to be satisfied:

$$\frac{C_1}{L_1} + \frac{C_2}{L_2} \cdot \cdot \cdot + \frac{C_n}{L_n} \leq 1.00$$

C denotes the average concentration of the respective radionuclide, and L denotes its concentration limit.

(iii) Where alpha emitters, strontium-90, radium-228, iodine-129, iodine-130 and lead-210 are known to be absent, routine analyses for dissolved gross beta radioactivity (excluding potassium-40 contribution) may be employed to monitor and show compliance with this criterion (except for tritium) as long as the gross concentration does not exceed 100 pCi/L. When these conditions are not met, routine quantitative analyses of individual radionuclides are to be performed to show compliance. Except in cases where tritium from other than natural sources is known to be absent, routine tritium analyses are to be performed to show compliance. (Note: "Absence" means a negligibly small fraction of the specific concentration limit, where the limit for unidentified alpha emitters is taken as the limit for radium-226.)

(iv) For radionuclides associated with suspended material in transport, the average concentration limits are to be 1/150 of the corresponding maximum permissible concentration in water (insoluble form) for continuous occupational exposure as recommended by the National Committee on Radiation Protection. In-stream sedimentation of these materials is not to produce solids beds that are not in compliance with subsections (q) (i) and (q) (ii) (because of leaching) and/or excessive accumulation in native flora and fauna.

(v) Average concentrations are to be computed from monitoring data acquired during the previous 12 months; maximum concentrations are not to exceed three times the average concentration limits specified.

(vi) Variances from concentration limits specified will be permitted only if the contributing source is non-controllable or a natural source. Best available treatment must be provided for man-made discharges, and the exposure received by affected population groups must be within established dose limits.

(r) No wastes are to be discharged and no activities conducted which, either alone or in combination with other wastes or activities, will result in the dissolved gas content relative to the water surface to exceed 110 percent of saturation.

(s) Bioassay median tolerance concentrations are to be based on latest available research results for the materials, by bioassay tests procedures for simulating actual stream conditions as set forth in the latest edition of Standard Methods for the Examination of Water and Wastewater published by the American Public Health Association, or in accordance with tests or analytical procedures that have been found to be equal or more applicable by EPA. Bioassay studies are to be made using the most sensitive local species and life stages of economic or ecological importance; provided other species whose relative sensitivity is known may be used when there is difficulty in providing the most sensitive species in sufficient numbers.

When specific application factors are not available, the factor is to be determined by using methods listed in Water Quality Criteria published by the Federal Water Pollution Control Administration (1968), or by using other methods accepted as equal or applicable by EPA.

(t) Metal limits for the Clark Fork River (mainstem) from the confluence of Warm Springs Creek to the confluence with Cottonwood Creek are:

Material	Average Daily Concentration ug/l	Maximum Instantaneous Concentration ug/l
Total copper	90	180
Dissolved copper	30	40
Total zinc	300	1,000
Dissolved zinc	80	140
Total iron	1,300	2,200
Dissolved iron	150	160
Total lead	100	100
Dissolved lead	100	100
Total cadmium	10	10
Total arsenic	10	16
Total mercury	1	1

Metal limits for Clark Fork River (mainstem) from the confluence of Cottonwood Creek to the Idaho state line are:

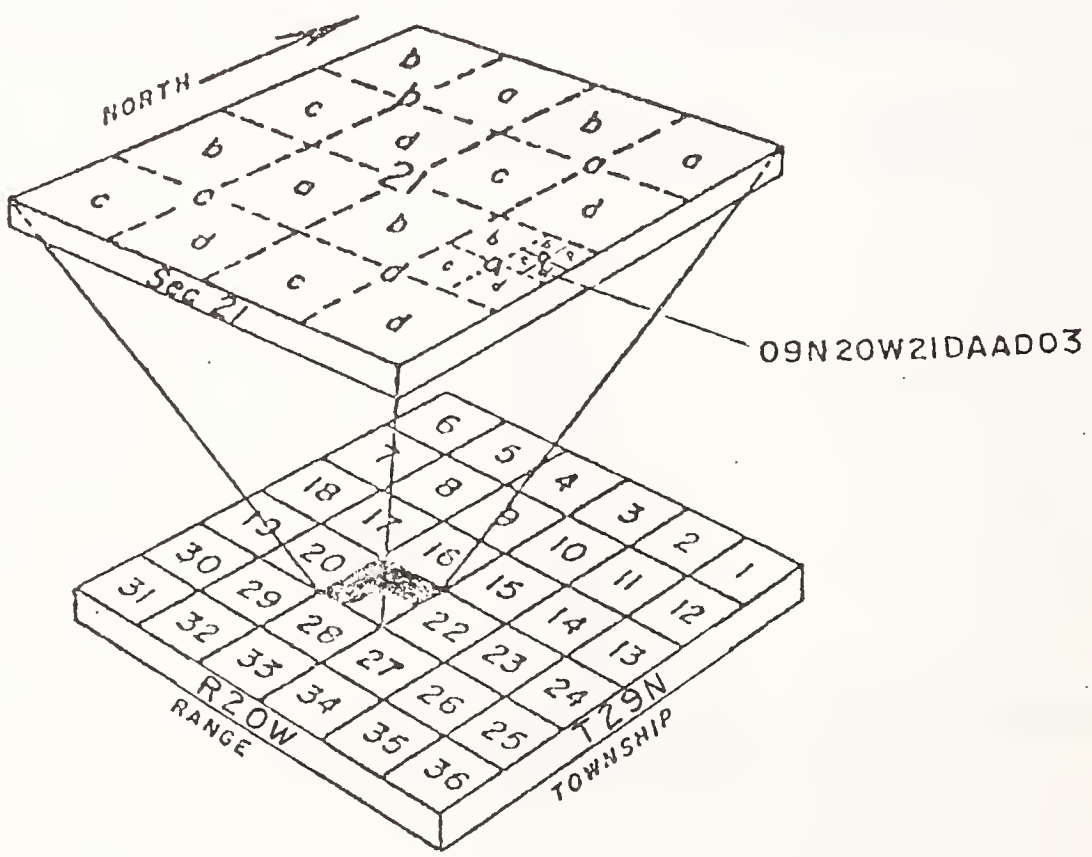
Material	Average Daily Concentration ug/l	Maximum Instantaneous Concentration ug/l
Total copper	50	90
Dissolved copper	30	30
Total zinc	100	200
Dissolved zinc	70	80
Total iron	300	1,300
Dissolved iron	150	150
Total lead	50	50
Dissolved lead	50	50
Total cadmium	10	10
Total arsenic	10	10
Total mercury	1	1

(History: Sec. 69-4814, R.C.M. 1947; IMP Sec. 69-4808.2(1)(b), R.C.M. 1947; Order MAC No. 16-1; Adp. 12/31/72; Eff. 12/31/72; AMD, MAC Notice No. 16-2-3, Order MAC No. 16-2-5; Adp. 7/13/73; Eff. 11/4/73; PRIOR p. 16-375; AMD, MAC Notice No. 16-2-31; Order MAC No. 16-2-11; Adp. 7/19/74; Eff. 9/5/74; PRIOR p. 16-387, 391, 393, 393.1, 393.4.).

APPENDIX C

SYSTEM FOR GEOGRAPHICAL LOCATION OF FEATURES

Features such as water sampling sites, wells, and springs are assigned a location number that is based on the system of land subdivision used by the U. S. Bureau of Land Management. The number consists of fifteen characters and describes the location by township, range, section and position within the section. The figure below illustrates this numbering method. The first three characters of the number give the township, the next three the range. The next two numbers give the section number within the township, and the next four letters describe the location within the quarter section (160-acre tract), and quarter-quarter section (40-acre tract), and a quarter-quarter-quarter section (10-acre tract), and the quarter-quarter-quarter-quarter (2 1/2-acre tract). These subdivisions of the 640-acre section are designated as A, B, C, and D in a counterclockwise direction, beginning in the northeast quadrant. If there is more than one feature in a 2 1/2-acre tract, consecutive digits beginning with the number 02 are added to the number. For example, if a water quality sample was collected in Section 21, T29N, R20W it would be numbered 29N20W21DAAD02. The letters DAAD indicate that the well is in the southeast 1/4 of the northeast 1/4 of the northeast 1/4 of the southeast 1/4, and the number 02 following the letters DAAD indicates that there is more than one site location in this 2 1/2-acre tract.



APPENDIX D

PROPOSED
FY76 PRIORITY LIST

COMMUNITY	STREAM SEGMENT	WATER USE	POPULATION SERVED	SCOPE OF PROJECT	PHASE CONSTRUCTION	TOTAL POINTS
Three Forks	6	6	2	30	30	74
Great Falls	4	4	3	30	30	71
Butte	8	2	3	40		53
Corvallis	6	6	1	40		53
Victor	6	6	1	40		53
Miles City	6	2	2	40		50
Poplar	6	2	2	40		50
Blgs. 6th Ave. N. Int.	4	2	3	40		49
Whitefish	8	6	2	30		46
Columbia Falls	8	6	2	30		46
Polson	8	6	2	30		46
Gallatin County RID 305	8	6	2	30		46
Bozeman	8	4	3	30		45
Anaconda-Opportunity	6	6	3	30		45
Bigfork	8	6	1	30		45
Livingston	6	6	2	30		44
Dillon	6	6	2	30		44
Libby	6	6	2	30		44
Hamilton	6	6	2	30		44
Red Lodge	6	6	2	30		44
Big Timber	6	6	2	30		44
Choteau	6	6	2	30		44
Townsend	6	6	2	30		44
Thompson Falls	6	6	2	30		44
Boulder	6	6	2	30		44
White Sulphur Springs	6	6	2	30		44
Eureka	6	6	2	30		44
Whitehall	6	6	2	30		44
Stevensville	6	6	1	30		43
Manhattan	6	6	1	30		43
Lodge Grass	6	6	1	30		43
Sheridan	6	6	1	30		43
Sunburst	6	6	1	30		43
Absarokee	6	6	1	30		43
Darby	6	6	1	30		43
Ennis	6	6	1	30		43
Drummond	6	6	1	30		43
East Glacier	6	6	1	30		43
Roberts	6	6	1	30		43
Hobson	6	6	1	30		43
Bearcreek	6	6	1	30		43
Lewistown	6	4	2	30		42
Laurel	6	4	2	30		42
Hardin	6	4	2	30		42
Harlowton	6	4	2	30		42

COMMUNITY	STREAM SEGMENT	WATER USE	POPULATION SERVED	SCOPE OF PROJECT	PHASE CONSTRUCTION	TOTAL POINTS
Browning	6	4	1	30		41
Chester	6	4	1	30		41
St. Ignatius	6	4	1	30		41
Hot Springs	6	4	1	30		41
Valier	6	4	1	30		41
Brady	6	4	1	30		41
Judith Gap	6	4	1	30		41
Rocker	8	2	1	30		41
~~Ramsay~~	~~8~~	~~2~~	~~1~~	~~30~~		~~41~~
Sidney	6	2	2	30		40
Wolf Point	6	2	2	30		40
Baker	6	2	2	30		40
Forsyth	6	2	2	30		40
East Helena	6	2	2	30		40
Circle	6	2	1	30		39
Big Sandy	6	2	1	30		39
Broadus	6	2	1	30		39
Stanford	6	2	1	30		39
Denton	6	2	1	30		39
Richey	6	2	1	30		39
Gildford	6	2	1	30		39
Dodson	6	2	1	30		39
Rocky Boy	6	2	1	30		39
Deer Lodge City & Prison	2	4	2	30		38
Malta	4	2	2	30		38
Warm Springs	4	2	2	30		38
Fairfield	2	4	1	30		37
Fromberg	2	4	1	30		37
Missoula Sewers	8	6	2	15		31
Whitefish Sewers	8	6	2	15		31
Kalispell Evergreen	8	6	2	15		31
Belgrade	8	6	1	15		30
Lakeside	8	6	1	15		30
Willow Creek	8	6	1	15		30
Amsterdam-Churchill	8	6	1	15		30
Bozeman Sewers	8	4	2	15		29
Dillon Sewers	6	6	2	15		29
Plains	6	6	2	15		29
Troy	6	6	2	15		29
Livingston Sewers	6	6	1	15		28
Lolo	6	6	1	15		28
Sheridan Sewers	6	6	1	15		28
Ulm	6	6	1	15		28
Swan Lake	6	6	1	15		28
Clyde Park	6	6	1	15		28
Melrose	6	6	1	15		28
Harrison	6	6	1	15		28
Martinsdale	6	6	1	15		28
Basin	6	6	1	15		28

COMMUNITY	STREAM SEGMENT	WATER USE	POPULATION SERVED	SCOPE OF PROJECT	PHASE CONSTRUCTION	TOTAL POINTS
Great Falls Sewers	4	4	3	15		26
Butte Sewers	8	2	1	15		26
Lewistown Sewers	6	4	1	15		26
Conrad	6	4	1	15		26
St. Ignatius Sewers	6	4	1	15		26
Helena Sewers	6	2	2	15		25
Helena Valley	6	2	2	15		25
Fort Benton	6	2	2	15		25
Ashland	6	2	2	15		25
Lincoln	2	6	2	15		25
Billings Sewers	4	2	3	15		24
Miles City Sewers	6	2	1	15		24
Sidney Sewers	6	2	1	15		24
Roundup Sewers	6	2	1	15		24
Stockett	2	6	1	15		24
Simms	2	6	1	15		24
Kremlin	6	2	1	15		24
Geyser	6	2	1	15		24
Havre Sewers	4	2	2	15		23
Kalispell Storm Sewers	8	2	3	10		23
Billings Heights	4	2	2	15		23
Huntley	4	2	1	15		22
Gt. Fls. Storm Sewer Sep.	4	4	3	10		21
Chinook	6	2	2	10		20
Power Teton-Co. W. Assoc.	2	2	1	15		20
Cut Bank Water Treatment	6	6	2	5		19

An acceptable application must be submitted within 90 days of notification by the Department.

APPENDIX E

PUBLIC HEARING

Following legal advertising, a public hearing for the Lower Clark Fork Water Quality Management Plan was held in Room 201 of the Missoula County Courthouse Annex, Missoula, Montana at 7:30 p.m. Tuesday, December 2, 1975. Hearing officer was Donald G. Willems and also present for the Department was David A. Nunnallee. The hearing was attended by about 25 persons. The hearing was recorded in its entirety and the tape is now stored in the Department's Helena office for future reference.

The hearing was opened by Donald G. Willems, Chief, Water Quality Bureau, Division of Environmental Sciences, Department of Health and Environmental Sciences. The purpose of the plan and its relationship with other water quality management plans, was explained by Mr. Willems. Mr. Dave Nunnallee, Branch Office Supervisor with the Water Quality Bureau in Kalispell, then outlined the contents of the plan and the major problems found within the basin. The hearing was then opened for public statements.

Dr. Ron Erickson with the University of Montana, Chemistry Department, submitted a copy of "Phenols in the Clark Fork River" written by Dr. Erickson, C. Bardwell and J. Sosebee. He requested a consideration of this report be given in the writing of the final water quality management plan. He stated that 30 to 40 percent of phenols were not measured by the normal methods. He also stated that phenols were less this year than the previous year which would seem to indicate that the new treatment process utilized by Hoerner-Waldorf is doing a better job than the old system. He also cautioned that the water flow was higher during 1975 than 1974 and this could also be a reason for the decrease in phenols. Dr. Erickson indicated the apparent lack of concern for groundwater in the report. He felt that groundwater should be given as much consideration as surface water. He referred to Page 87, Item 6 "Regulations and Guidelines" in which it was indicated that the regulatory framework for water pollution control will be reviewed by the bureau legal staff. The adequacy of the regulations to prevent pollution will be assessed. He wondered what the time schedule is on this and if it would be available to the public when it was completed. Mr. Willems indicated that this was being done through an Old West Commission grant and the report was due to be completed by July 1, 1976, but that the bureau may ask for a time extension on the project. The information would be made available to the public when it is completed. Mr. Willems also indicated that the bureau is presently assessing other states' groundwater regulations and through contractual work, it was hoped to have groundwater regulations in rough draft form by the end of the fiscal year.

Ms. Ann Bailey, graduate student at the University of Montana, submitted a statement on Milltown Dam. She requested that this report be reviewed before the final plan was printed. Ms. Bailey indicated that heavy metals coming down the Clark Fork River are trapped in the reservoir behind Milltown Dam and periodic flushing of the reservoir creates water pollution below the dam.

Mr. David J. Maclay, 828 Ronald, Missoula, Montana, a rancher and representing Bitterroot Water, Inc., stated that a study had been made on water availability by a University of Montana graduate student for his organization. He expressed concern of the availability of water for all beneficial uses and wondered if the state was attempting to maintain minimum flows in all live streams. Dave Nunnallee answered that it would be highly desirable to maintain a minimum flow in all streams as it did little good to maintain high water quality and only have this water taken from the streams. He stated that prior to the new constitution that there was no way that water rights for water quality purposes could be obtained. With the new constitution this was a possibility.

Dr. Ron Erickson, referring to page 20 of the plan in the section on enforcement, asked if improvements had been made in the bureau's water quality enforcement program. Mr. Willems answered by stating that enforcement was a cooperative program between the EPA and the bureau. Through this program, cases have been filed in court in which penalties have been sought. The general enforcement program consists of issuing compliance orders and a large number of these have been issued during the past year. The enforcement program has been greatly improved during the last year and a half. Further improvement is expected in the near future.

There being no other statements or questions, the hearing was adjourned at 8:15 p.m. A 30-day period was given for the receipt of additional comments to the plan.

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BITTEROOT RIVER DRAINAGE
SUB-BASIN OF THE
LOWER CLARK FORK
RIVER BASIN

LOWER CLARK FORK RIVER BASIN

(NOT INCLUDING BITTERROOT SUB-BASIN)